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MODERN ELECTRICS

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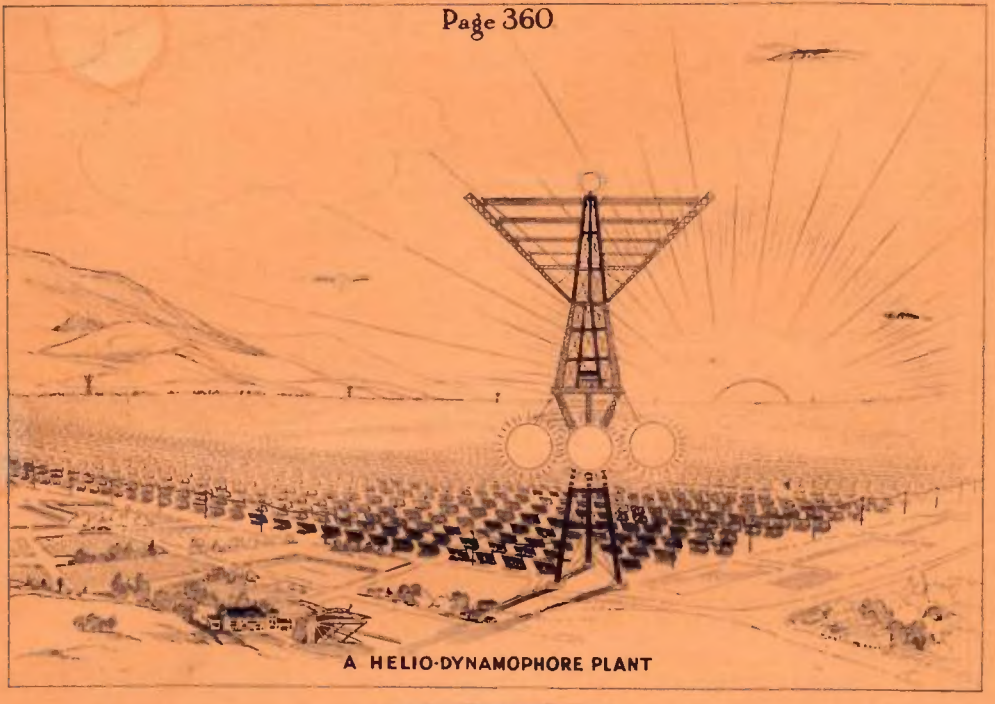

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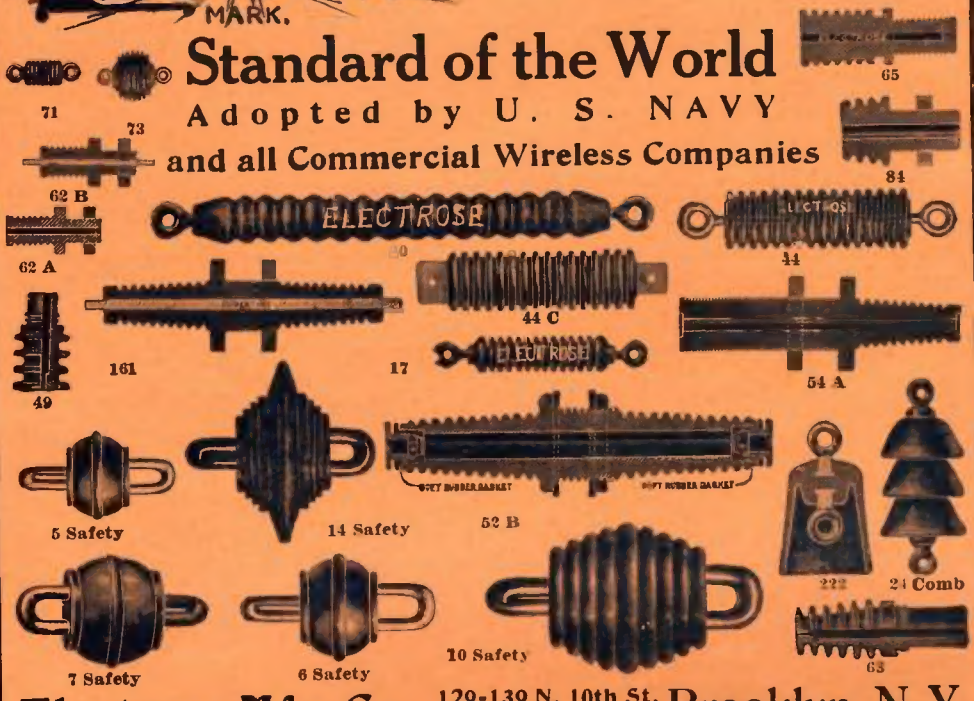

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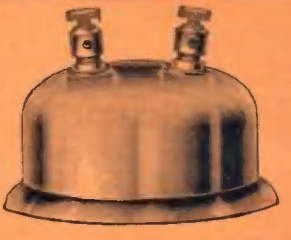

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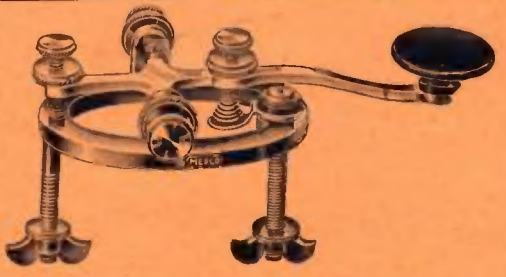

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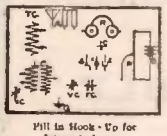

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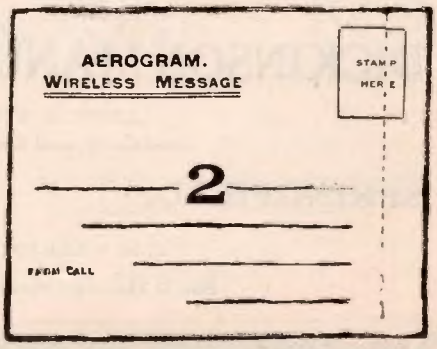

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Modern Electrics

VOL. IV. SEPTEMBER, 1911. No 6.

The Practical Electrician

A Popular Course in Electricity on the Construction of Electrical Apparatus and Experiments to be Conducted with them

By PROFESSOR W. WEILER, of the University of Esslingen, (Germany)

Translation by H. GERNSBACK

CHAPTER I.—Continued.

43. E. M. F. DURING OPEN AND CLOSED CIRCUIT.

EXAMPLES. A battery has an E. M. F. of 1.5 Volt and an internal resistance of 0.1 Ohm. Its current, if the outer resistance, Ra, is not considered, i.e., if its electrodes are shorted by means of a heavy copper strip, will consequently be $C=\frac{1.5}{0.1}=15$ Amperes. If Ri=2 Ohms, its current will be $C=\frac{1.5}{2}=0.75$ Ampere.

If in the same battery, having 1.5 Volt and 2 Ohms, an outer resistance, Ra, of 10 Ohms is placed, the current will be $C=\frac{1.5}{2+10}=0.125$ or 125 Milliampere. If however, Ra=1000 Ohms, we have $C=\frac{1.5}{2+100}=0.0147$ Ampere=14.7 Milliampere.

Therefore, if a heavy current is drawn from any battery, its internal chemical activity increases considerably more than if only a small current would be drawn; on the electrodes a large amount of gas is liberated and this means that the battery will polarize quickly. Therefore if heavy currents are to be taken from batteries, it is absolutely necessary to use powerful depolarizers, such as are found in the nitric and bichromate-acid batteries.

Conclusion. In the second example above we took Ra=10 Ohms; the E. M. F. of 1.5 Volts therefore must force 0.125 Ampere through the entire circuit. Thus it is plain that a part of the E. M. F. must be used to force these 0.125 Amperes through the battery itself, but as the latter has a resistance of 2 Ohms, the E. M. F. must be $R\times C=2\times 0.125=0.25$ Volts. Consequently ¼ of a volt is used up to overcome the *inner* resistance, Ri, and there remains 1.25 Volts measured across the poles of the battery for the *outer* circuit, Ra.

Analogy. Fig. 45. If we close the stopcock, H, entirely, the water in all the tubes, B, C, D, will rise exactly to the same level as the level of the tank, K. The aqua motive power is the same everywhere, as the E. M. F. in a closed battery. But if H is now opened a little, the level in all the tubes falls but little also; we have little amperage, but still a high voltage, or high pressure in the tubes. If we now open H entirely, the amperage

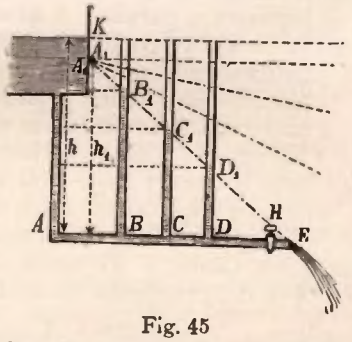

Fig. 45

rises, but the pressure towards the opening decreases more and more.

The height of the pressure, h_1, is sufficient to overcome the resistance, thus A, $K=h-h_1$ produces the speed of the flow.

44. GROUPING OF BATTERIES.

As shown in Figs. 8 and 9, batteries may be either connected in series or in parallel. Between these, however, there are other possible groupings, see Fig. 46.

Law. The total E. M. F. (Voltage) of batteries when connected in series is equal to the sum of the single cells, $E=e_1+e_2+e_3$, *etc.*

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Proof. If we place a zinc rod and a copper rod in a vessel containing acidulated water and ground the zinc pole, the copper pole will have a tension of 1 Volt. If we connect this copper pole with the zinc pole of the next cell, this zinc pole acquires from the preceding copper pole the tension of 1 Volt and the copper pole of the second cell a tension being 1 Volt higher than its zinc pole. Consequently we will find a tension of 2 Volts on the copper pole of the second cell.

If thus 10 cells are connected in series, a tension of 10 Volts will be recorded at the two extreme poles. If all cells are well insulated, the first zinc will have a tension of —5 Volts and the last copper a tension of +5 Volts, the potential difference consequently is again 10 Volts.

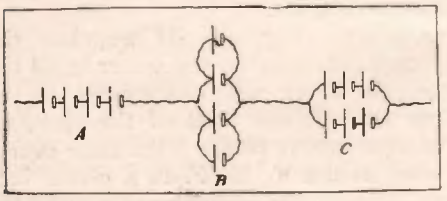

Fig. 46

45. AN EXAMPLE FOR 20 BATTERIES

a.) Possible groupings.
1.) 20 batteries in parallel, 1 in series.
2.) 10 batteries in parallel, 2 in series.
3.) 5 batteries in parallel, 4 in series.
4.) 4 batteries in parallel, 5 in series.
5.) 2 batteries in parallel, 10 in series.
6.) 1 battery in parallel, 20 in series.

If we have a battery of 1 Volt and 1 Ohm, which is equivalent of a large Daniell cell, and we find that the outer resistance is 5 Ohms, if we apply Ohm's law on above six groupings, we find:

$C=\frac{E}{Ri+Ra}=\frac{1}{1/20+5}=0.198$ Ampere

because the tension is only that of *one* cell and the internal resistance is distributed over 20 cells.

2) $C_2=\frac{2}{2/10+5}$ 0.38 Ampere.

3) $C_3=\frac{4}{4/5+5}$ 0.69 Ampere.

4) $C_4=\frac{5}{5/4+5}$ 0.8 Ampere.

5) $C_5=\frac{5}{10/2+5}$ 1 Ampere.

6) $C_6=\frac{20}{20+5}$ 0.8 Ampere.

b.) Grouping for greatest economy. One connects the batteries in such a manner that the total internal resistance is very small against the external resistance.

c.) Grouping for quick action.

If there are electromagnets, or other apparatus with self-induction in the circuit, which always try to oppose the rush of the current, one makes the internal resistance higher than the external resistance; thus all cells are connected in series.

46. TESTING OF BATTERIES.

In the English Post Office batteries are tested by discharging them through a resistance of 10 Ohms. The time is closely noted during the period in which the voltage has fallen to 50 per cent. of its original value. This gives a time of from 6 to 42 days for different batteries (wet) of the Leclanché type.

Batteries for heavy currents should be tested both with volt and ammeter in intervals of from 1-2 hours. The readings should be recorded on square-ruled paper and at the close of the test curves be drawn. The voltage curve for a good battery should never be steep, but should run almost horizontal.

The storage battery which comes nearest to perfection in this respect has a long drawn out curve and may be taken as a model. See Fig. 47.

47. THERMO ELECTRIC CELLS.

In the year 1822 Seebeck discovered that one obtains a galvanic current, if one solders (rivets, connects, screws) the ends of two wires, or plates of different materials, provided that this joint is heated. But it is also possible, to a certain extent to produce a current, using one metal only. Thus if one makes a knot in a copper or platinum wire, and one heats a spot near the knot, the current will flow from the heated part towards the knot.

The intensity of such currents is dependent of the difference of the temperatures between the soldered connection and the cooled part, and also of the nature of the metals used, that is of the difference of the molecules and their respective state and consequently of the difference of the resistance which the various metals oppose to the flow of the current as well as that of the heat. At high temperatures, as for instance for Copper-Iron the E. M. F. decreases again at 275° centigrade; using Zinc-Iron the reversing point lies at 200 degrees.

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Careful researches of various metals and the thermo-electric effects upon each other gave the following tension-series: + Antimony, Iron, Silver, Zinc, Tin, Copper, Platinum, German Silver, Bismuth —. The thermo electric force for each 1 degree of difference in temperature is, expressed in millionths of a volt about as follows.

Copper-Iron	German-Silver-Iron
13	25
Platinum-Iron	Bismuth-Antimony
18	90

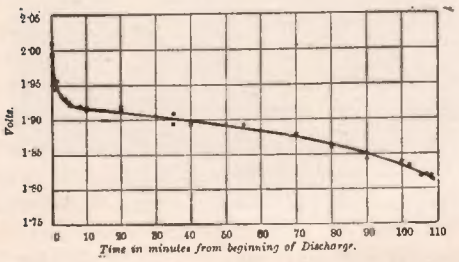

Fig. 47

One-millionth Volt=10^{-6} Volt is termed a Microvolt.

Against lead, the E. M. F. for 1 degree difference in temperature in Microvolt is as follows:

Bismuth, wire	+ 97.0
Cobalt	+ 22.0
German Silver	+ 11.75
Mercury	+ 0.418
Lead	0.
Tin	— 0.1
Copper, commercial	— 0.1
Platinum	— 0.9
Gold	— 1.2
Antimony, pure, wire	— 2.8
Silver	— 3.0
Zinc	— 3.7
Copper, electrolytical	— 3.8
Antimony, commercial	— 6.—
Arsenic	— 13.56
Iron, pianowire	— 17.50
Phosphorus, red	— 29.70
Tellurium	—502.00
Selenium	—807.00

Example: German-Silver—Iron 11.75 —(—17.50)=29.25 and for 100 degrees 2925 Microvolt=0.002925 Volt.

(To be Continued.)

POWER MEASUREMENT FOR TRANSFORMERS.

By H. V. Roome.

The recognized means of measuring the input to any small piece of electrical apparatus is by means of the usual volt and ammeter. This is particularly true as regards direct current apparatus, as direct current apparatus can be bought at very reasonable prices. However, in alternating current measurements, meters of special construction are used, as direct current meters will not work on A. C. The prices of alternating current meters are not within reach of the average amateur.

Many amateurs are probably at a loss when it comes to determining the amount of energy their wireless transformers are consuming. The purpose of this article is to explain a simple method to measure the amount of energy supplied to a transformer.

The only things necessary for the measurement of the energy supplied to a transformer are a watch and the integrating wattmeter already connected in the circuit. This integrating wattmeter is the familiar meter installed by the light-company to measure the total amount of energy a customer consumes each month. The first step is to find out the constant of the meter. This constant is usually a simple fraction as: one-half, one-third, etc. A Tungsten lamp, or other consumer of energy where the amount of energy consumed is known, will serve the purpose in finding the meter constant. Connect the test lamp (a 25 or 40 watt Tungsten serves the purpose admirably) in the circuit, and let it burn steadily while the disc on the meter is timed for ten revolutions. This timing operation is very easy as the disc on the meter has a black streak or other identifying mark on it, so the revolutions of the disc can be counted. Then substitute in the formula:

(1) $K=\frac{\text{watts consumed} \times S}{R \times 3600}$

In which:

K is the meter constant.

R is the number of revolutions of the disc.

S is the number of seconds.

The watts consumed are known from the label on the lamp, S (the number of seconds required for the disc to make R

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revolutions) is known, so K can easily be found.

By employing the same formula the amount of energy consumed by a transformer, or other consumer of electrical energy, can be found. The method is simple. Connect the transformer on the desired tap and put something on the sending key so the spark will run continuously. Then time the meter for ten revolutions exactly as was done previously. As K, the meter constant, is already known, the same formula used to determine the meter constant K, furnishes the solution of the number of watts used. The formula is used in a little different form for convenience.

(2) Watts consumed $=\frac{3600 \times R \times K}{S}$

In using the above formulæ, and in finding the meter constant, be sure there is no other consumer of electrical energy in the circuit at the same time. It is not necessary to time the meter for ten revolutions, this number is recommended as ten is an easy number with which to work. Five revolutions might just as well be used, as the formula is general.

THE LEGALITY OF "WIRELESS TAPPING."

By Stanley McClatchie.

Some recent occurrences in the city of Los Angeles, which have brought into question the right of the wireless experimenter to even listen to or copy, the private messages transmitted by commercial wireless stations, should be of decided interest to every amateur.

The owner of a certain newspaper known as the *Tribune,* published in the city of Los Angeles, has, for many years, carried on a fight against his local contemporaries, and particularly against three morning papers known as the *Times,* the *Examiner,* and the *Herald,* it being alleged that these publications had formed a "trust" for the purpose of injuring the previously mentioned owner of the *Tribune.*

On July 29th, a message was transmitted from the United Wireless station in Los Angeles, to the station in Catalina, a popular summer resort, which was addressed to the editor of the *Herald,* and signed by the *Examiner* editor, Hoskins, which contained conclusive evidence of the *Times, Herald, Examiner,* affiliation. This message was read by three amateurs who were listening at the time, and two of them, Kenneth Ormiston and Harry V. Roome, divulged the contents of the message to the *Tribune,* which thereupon published it, together with a most extended eulogy of Roome and Ormiston, and also of the third boy, David Smith, who corroborated their statements.

The papers concerned made no attempt to deny the message, but were, of course, interested in seeing that proceedings were instituted against those concerned with its publication. The three boys, together with numerous *Tribune* editors and wireless operators, were at once summoned to appear before the Grand Jury. It was alleged that under the wire tapping law the boys were punishable for having copied a message sent by a telegraph company, wire, wireless, or otherwise, and doubly so for having divulged its contents but the owner of the *Tribune* at once took upon himself all responsibility in the matter, and he was accordingly indicted by the Grand Jury, and is now pending trial on what the unfriendly newspapers are pleased to term "the wire tapping crime."

This matter and its outcome should be of vital interest to all owners of wireless stations, as the legal right of any person to read the contents of a wireless message without the consent of the person for whom the message is intended, is brought into question. The boy operators would have been liable to imprisonment for a term of five years had their connection with the making public of the message been pursued, and they convicted, and it is probable that the editor of the *Tribune* will be subject to this punishment in case it is found that he can be convicted under the present law.

The *Tribune* has suddenly shown extreme interest in the cause of the wireless amateur, and recently published photographs of the officers of the Wireless Association of Southern California, Howard W. Lewis, Austin Roerhig, and Frank Hopkinson, together with an extended account of the wireless experimenters of Los Angeles, and a list containing the names of many of them.

A full account of the results of the trial, and their bearing on the rights of the experimenter, will be given later *Modern Electrics* readers.

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Electric Trucks For Handling Baggage and Freight

A NEW development in mechanical methods of handling freight, baggage, etc., is the use of light motor trucks

to replace the ordinary hand truck for transporting baggage and freight at railway stations, freight houses and steamship piers; such trucks are adaptable also for use at warehouses, manufacturing or storage plants, and similar establishments where freight and baggage has to be moved from place to place. Storage Battery Trucks for this class of service have been perfected by Mr. William C. Carr of Buffalo, New York, as shown in the accompanying cuts.

This truck has a steel frame, mounted on four wheels, and carrying at one end a steel battery box. At the other end is a steel gate to retain the load, but for long or bulky packages this can be lowered so as to rest on an extension of the sills, and thus form an extension of the platform. At each end are two operating levers and a brake treadle, with a shelf or step on which the operator rides. Current is supplied to the motor driving a countershaft from which there is a chain drive to one pair of wheels. The platform is mounted on springs over the axles, and these, with the broad rubber tires on the wheels insure easy and noiseless movement. In the standard size, the platform is 7x3½ feet, or its length may be increased to 10 ft. by lowering the end gate. The wheels are 16 inches in diameter, with a gauge of 3 feet and a wheelbase of 4 ft. 2 inches. In the freight truck, the platform is 20 inches above the floor; but for trucks handling baggage, mail and express matter this is increased to 3 ft. by an upper deck; the movable end gate, however, is retained. Special sizes can be made as required.

The battery consists of 24 cells, with a capacity of 56 amperes for four hours. The motor is of 3 H.P., and will stand an overload of over 100 per cent, so that it is said the truck can carry a load of one ton up a grade of 20 per cent. The speed is from 2 to 10 m.p.h. and one charge of battery is sufficient for a day's work. The weight of the truck is 2,000 lbs., and it will carry a load of 2,000 to 4,000 lbs. The great advantage of the truck is not so much in its load capacity as in its speed and flexibility of movement, by which it is enabled to carry loads rapidly from the receiving point to any desired car (or other point). The truck can be run directly into a freight car to deliver or receive a load, so that there is no more handling of freight than by the use of hand trucks. At the same time, the truck can carry a heavier load and move much more rapidly than a hand truck.

The Erie R. R. has 20 of these electric trucks in use at one of its piers in Jersey City, where they handle about 600 tons

(Continued on page 372)

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Electric Time Keeping

AMONG the numerous uses of the electrical current in the various commercial and domestic activities, one not to be overlooked, is that of electric time-keeping. On many railroads, office-buildings, and other institutions, extensive systems are em-

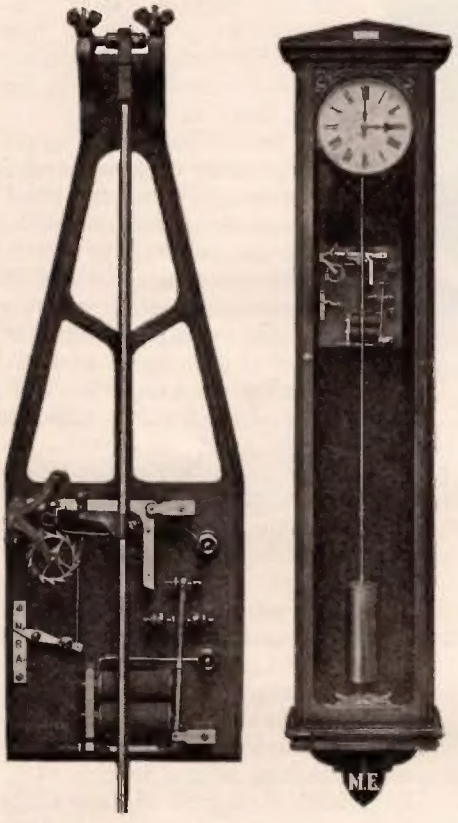

Fig. 1

ployed, all the clocks being controlled from one master clock.

As early as 1837, Alexander Bain, an Englishman, had suggested the control of numerous clocks from one unit, by electrical means. Since that time, and actively beginning in 1899, a multitude of different devices and systems have been devised to fulfill the purpose of electrical clock systems. We have illustrated in this article, the system used by the Synchronome Company of England.

In Fig. 1 we have a photograph of the master clock mechanism, and Fig. 2 illustrates the diagram for the same apparatus. The reader will note that it consists of two moving parts, the first of which is a right-angled lever, G, pivoted on F, and in its normal position supported on a spring catch, K. Once every half minute the lever is let down on the armature, A, in the act of giving an impulse to the pendulum, P. Current from any available source then passes through the series circuit of dials and the magnet, M, which attracts the armature, A, and throws up the lever, G, onto its catch again. The pendulum releases the switch by means of a 15 toothed wheel, C, which carries a vane, D, engaging with the clutch, K, at each revolution. The hook, B, pivoted upon the pendulum pulls this wheel round once every thirty seconds. At the moment of its release, the little roller, R, on the gravity arm, G, is just above the bend of the pallet, J, down which it runs, giving an impulse to the pendulum at the moment

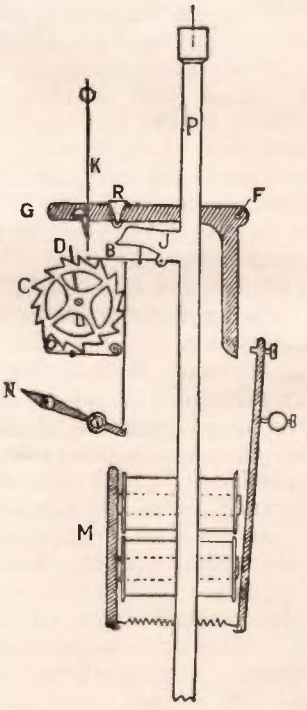

Fig. 2.

when it passes through its zero or central position. Thus the pendulum is free at all times except in the middle of its swing. Not only is the escapement de-

Continued on page 372

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"Anion" Treatment

By Dr. Alfred Gradenwitz.

IT is well known that patients suffering from the gout, rheumatism or nervous pains are affected by an approaching change of weather. This striking fact is neither explained by variations in temperature or atmospheric pressure, nor by the variable moisture of the air and the direction of the wind. A solution of this puzzle should therefore be sought in some other connection, viz.: by investigating the curative effects of hot springs, which, though being chemically indifferent, are known to be so efficacious in healing troubles such as those above enumerated.

There has for some time been a tendency to attribute the effects of these springs to their contents of radium emanation or rather to the A and B rays given out from this emanation and the substances made radio-active by a prolonged contact therewith. The patient using a hot spring thus finds himself in a medium filled with such rays (or in other words with free ions, both positive and negative) much more abundantly than the surrounding atmosphere which in its turn contains some appreciable amounts of them.

This striking analogy induced Dr. P. Steffens of Freiburg (Badenia), to ascribe the influence of weather changes on rheumatic and other pains and even partly on the well-being of healthy people, to atmospheric electricity, the percentage of free ions in the air being subject to variation in accordance with the weather. This suggested the possibility of using artificial ionization in the form of a strong flow of negative ions as a new curative agent. As influence machines giving out from their poles a stream of purely negative and positive ions did not seem to produce the required amounts of flow, a special apparatus was designed by the Veifa-Werke of Frankfurt-on-Main, for converting the high-tension currents from the negative pole of X-ray induction coils into some more suitable form, viz., either that of an "electrical wind" (applied by means of point electrodes) or that of a stream of sparks (applied by means of condenser electrodes).

This novel method of electric treatment ("anion" treatment as it is styled) has been applied with excellent results, first to rheumatic patients and then to some cases of affection of the heart or vessels as well as to local affection of the skin and articulations. Rheumatism of the muscles and articulations, sciatica and other forms or neuralgia are nearly always cured or, at least, improved in a marked degree, after 4-12 applications of "anion" treatment. In some cases a slight and quite temporary aggravation noted after the first applications recalls the well-known reaction of certain baths. The sleep of patients is improved in many cases. In connection with affections of the heart or vessels a reduction in the abnormally high blood pressure is noted, while the pulse becomes slower, stronger and more uniform. The treatment also allays most rapidly the pains of patients.

Whereas in all these cases the treatment was applied under the form of an

Auion Apparatus.

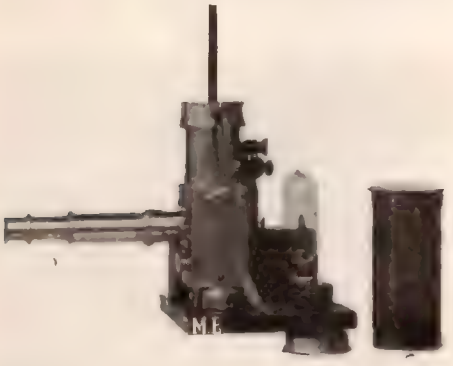
electric wind, Dr. Steffens uses a flow of sparks in connection with a condenser electrode in treating chilblains and gouty affections of the joints. The exterior symptoms of the case also allow the results to be accurately checked. The dark color of "red" hands is found rapidly to disappear, blood circulation being improved, the heat increased and the touch of the fingers made normal. In cases of acute gouty swellings, "anion" treatment by means of condenser electrodes was found to cure the lesion after three

applications, while any acute pains were definitely allayed after one or two séances.

From the above is seen the identity in the effect of anion treatment with that of radio-active baths. This perfect accordance would seem to bear out Dr. Steffens' hypothesis that this effect in both cases is due to an identical emission of free ions.

RADIO-ACTIVITY OF THE HUMAN BODY.

Mr. R. E. Caan of Heidelberg recently availed himself of the Becker emanometer for submitting a number of different human organs to radio-active tests. 41 pieces were examined, thus confirming the existence of an ionizing substance. Though nothing definite can as yet be stated in regard to the identity or otherwise of this substance with radium, its ionizing power would seem to bear out the hypothesis of its being a radio-active



Apparatus for Detecting Human Radio-activity.

matter. Brains are found to possess the highest activity; the heart and liver are less active and the kidneys and spleen are nearly inactive, while the lungs produce a striking ionization.

The social condition, profession and origin of subjects, do not seem to exert any noticeable influence on the radio-activity of their organs. However, their age seems to play a certain part in this connection, the amount of radio-active matter augmenting nearly always with increasing age. Though the number of cases so far studied be as yet insufficient to warrant any definite conclusion as to the greater or smaller radio-activity of healthy and sick organs respectively, morbid tissues seem to show a remarkable increase in radio-activity.

Two theories are suggested for explaining the origin of this radio-active substance, viz., absorption by the food and drinking water or absorption of the radio-active emanation introduced by respiration into the blood vessels by the colloidal matter of the organism. Both of these hypotheses would account for the increase in radio-activity observed with advancing age.

The radio-activity of human tissues seems to possess some importance for the vital phenomena themselves, though nothing definite can so far be enunciated in this connection.

1,000,000 PATENTS.

An idea as to the volume of patent applications granted, may be obtained from the fact that the 1,000,000 mark has been reached, and is published in the August 8th, 1911, Patent Gazette. This patent, No. 1,000,000 is for a vehicle tire. When it is remembered that many applications are not granted, we can safely state that the number of inventions have been far in excess of the patent rights granted. That America leads the world in inventions and new ideas, has been proven by the foregoing.

AROUND THE WORLD IN 16½ MINUTES.

At 7 o'clock P. M., August 21st, the New York Times sent the following message:

"Times, New York.

"This message sent around the world.
Times."

The message was sent merely as a test to ascertain the efficiency and speed of cable messages. The total distance travelled was 28,613 miles, and the message was transmitted through 16 relays. The average speed of the dispatch was 29 miles per second. This constitutes a record for commercial messages transmitted around the world. The fastest time for official messages was made eleven years ago, upon the opening of the Pacific Cable, when the officials sent a message around the world in 9½ minutes.

NOTICE.

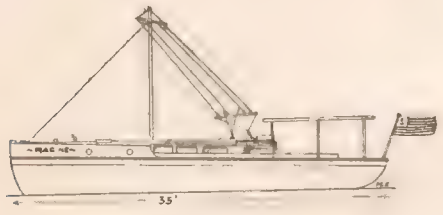
All wireless experimenters, and those who wish to be, in the State of Arkansas, will please write to E. G. Holman, 210 Center St., Little Rock, Ark.

Wireless On the Motor Boat

By Richard H. Foster.

On July 1, 1911, the following law went into effect: "On and after July 1, 1911, all vessels carrying passengers, and travelling over a greater distance than 100 miles must be equipped with wireless apparatus capable of covering a distance of at least 100 miles under all conditions and times."

This new law illustrates more than ever the necessity of all sea-going craft carrying wireless apparatus. From a point of safety, wireless apparatus is as necessary as life preservers. To be able to call for help when disabled, and to



-FIG. 1-

state the amount of damage, is far more satisfactory than the old-fashioned method of flag signalling.

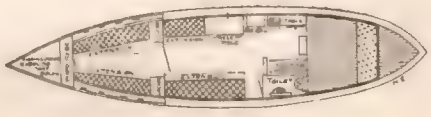
The following article has been written to show how easily, and at a reasonable cost, it is possible to equip small motor cruisers with suitable wireless apparatus. The apparatus described is of first-class make and efficiency and is not to be compared with the low-priced amateur apparatus on the market.

This article deals with the installation of a wireless set on a 35-foot Motor Cruiser, designed and manufactured by the Racine Boat Company of Racine, Wis. This design was published in the December number, 1910, of "Motor Boat," and a copy of this design is used to illustrate this article.

The first thing to consider when installing an outfit is the aerial or air-wires. These of course are strung from the mast head. The wooden spreaders at the top and bottom of the aerial are six feet long and of not more than three inches in diameter. The lighter the better. The aerial proper consists of four No. 14 bare copper or aluminum wires insulated from the spreaders by small porcelain cleats, such as are used for interior wiring. The aerial rope should run through a small pulley so that it can be easily lowered if desired. The spreaders are kept from swinging by cords fastened to the ends of each spreader and then fastened to the mast. The lower end of the aerial is insulated from the point of fastening by a large "Electrose" insulator, which prevents the high tension current from leaking to the deck. It is also best to use one of these insulators at the top end of the aerial but it may be omitted on account of its weight if desired.

The method of connecting the aerial and the general points of construction are shown in Fig. 1. The lead-in wires from the aerial are connected together, and pass through a thick rubber tube where they enter the cabin. This lead-in tube should be as efficient an insulator as possible, there being more danger of leakage here than at any other point in the installation. Special tubes for this purpose can be purchased.

The installation of the wireless apparatus is the next thing to be considered. A list of the apparatus to be purchased is given in the apparatus inventory. As-



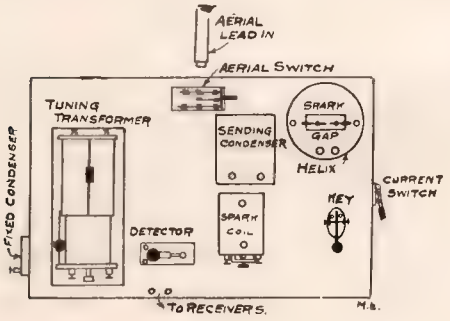
-FIG 2-

suming that the apparatus has been purchased the assemblying will be taken up.

The location of the "Wireless Room" or wireless table depends of course on the size and design of the boat. On the cruiser described the operating table was placed in the main cabin near the engine. The operating table should not be smaller than six by four feet, as wireless apparatus must be widely separated. The table should be situated so that a good lead to the aerial can be obtained.

The apparatus may be fastened to the table by small screws. All wiring should be done on cleats (especially transmitting wiring) and porcelain tubes used where woodwork is passed through. In this way there will be absolutely no more danger of fire than from ordinary electric lighting systems. The question of

transmitting power is the next thing to consider. This of course depends on whether the boat carries a dynamo. The larger the amount of current at hand, the larger will be the transmitting range. In this set a ten watt sending coil is used, which can be run by eight or ten volts, storage battery or dynamo. Do not use too strong a current on the coil, as there is danger of ruining the vibrator or straining the secondary.



-FIG. 3-

The arrangement of the apparatus will now be considered. By studying Fig 3 the location of the different pieces of apparatus can be easily seen. The aerial switch for changing from sending to receiving is located at the back of the table, where there will be no danger of the contacts being touched by accident. All transmitting wiring should be done with high tension cable, as a shock from the transmitting coil is not very pleasant and is sometimes fatal with large coils. The helix and sending key are located on the extreme right of the table. The key should be far enough from the edge, so that it can be easily worked. The sending coil and condenser are located near the center, the former with the vibrator end facing front for adjustments.

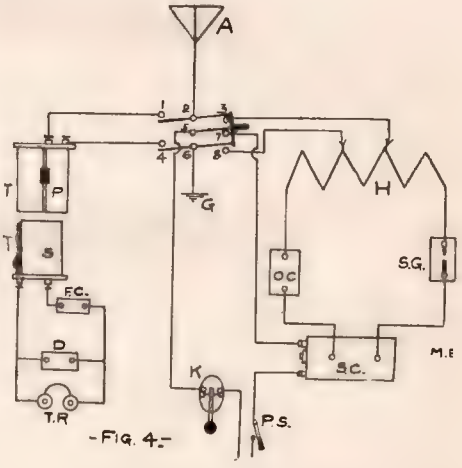
The receiving apparatus is located at the left of the table, and as far away from the transmitting side as possible. All wiring here may be done with ordinary flexible cord, well insulated. The small fixed condenser can be mounted on the side of the table out of the way. The tuning transformer is mounted with the secondary end toward the front, the detector being at the side of it. Two binding posts are fastened in the front of the table for connecting the telephone receivers. The apparatus is connected up as shown in Fig. 4 and can be easily traced.

APPARATUS REQUIRED.

Transmitting: Spark coil, 10 watts, helix, copper ribbon type, spark gap, small type, telegraph key, (legless), condenser (special transmitting).

Receiving: Ferron or silicon detector, tuning transformer, telephone receivers—(2000 ohms), small fixed condenser.

Of course it is necessary that one know the Morse code fairly well, and once this is accomplished the operation of the instruments is easy. The clips on the helix should be adjusted so that the spark in the gap is thick blue white. Never separate the gap over half an inch. Regulate the vibrator on the coil so that the spark is clear and fast with no lagging. When operating the sending set *keep hands off* of all *bare wires.* A bad shock will be the result otherwise. The receiving set will need only one adjustment as a rule unless the detector is jarred out of adjustment. Keep sliders on tuning transformer half way across the coils with secondary half into the primary. Adjust the detector knob until the metal point barely touches the crystal.



-FIG. 4-

A slight sound will now be heard in the 'phones. No battery is used with this detector. The wireless signals will sound like long and short buzzes in the 'phones, the strength of the signals depending on the distance, atmospheric conditions, etc. Tuning is accomplished by moving the sliders on the coils, and varying the secondary of the tuning transformer increases the strength or loudness of the signals. Tuning a station will always bring the signals in louder and clearer.

(Continued on Page 372)

A Sending Condenser

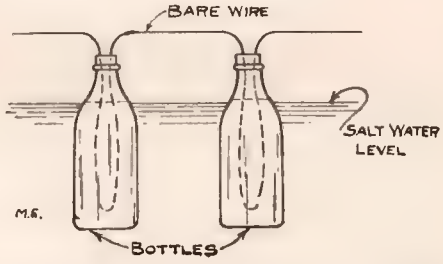
H. V. Roome.

Probably one of the greatest difficulties encountered in connection with the sending components of a wireless set is to get a satisfactory condenser. Plate condensers are now used extensively and the Leyden jar is seldom seen, except in commercial stations where cost is usually a secondary consideration. It is easy to see why the companies doing a commercial business prefer jars to plates. Jars have far less chance for brush discharge, as there is usually only a small perimeter of a jar which can cause brush discharge. But with plates, each side of each surface (usually tinfoil) of metal used in the construction of the plate condenser, causes brush discharge. In plate condensers great difficulty is experienced in satisfactorily applying the metal surface (usually tinfoil) to the glass plates so that there will be no bubbles, tearing of foil, etc.

I shall attempt to explain the construction of a condenser, having the essential advantages of a Leyden jar condenser.

The units used in construction of this type of condenser are large common glass bottles. The writer finds that Welch's grape juice, quart size bottles, fulfill the purpose admirably. The reason grape juice bottles are preferred is because they are of excellent quality and uniformity, and have no printing blown in the sides, making the glass non-uniform. Another reason is that these bottles can be obtained in large quantities from junk and bottle dealers at a reasonable cost.

Procure a number of the empty grape juice bottles, the number depending on the size of the particular sending outfit. In most cases for transformers of one-half kilowatt and over about one dozen bottles will be needed. This number will of course vary, depending on the characteristics of the transformer which is used with the condenser. Thoroughly wash the bottles, removing the paper labels. Next get a galvanized iron container for the bottles. Most any sort of galvanized can will do. A very satisfactory form of container is the familiar household washboiler. The boiler referred to is about 22 inches long, 12 inches wide, and 13 inches high, and has rounded ends and parallel sides. A boiler of this size will hold about 16 of the quart size bottles. Then fill the container or boiler about three-quarters full of water and pour common salt in the water until the solution is saturated and the salt begins to crystalize out of solution. Each of the grape juice bottles is now filled with the salt water to within about 4 or 5 inches of the top. This filling process should be carefully done with a funnel so the salt water will not splash on the upper part of the outside of each bottle. The reason for a little care at this



point will appear later. Carefully wipe the outside of the upper part of each bottle dry, after it is filled with the salt water. Then place each bottle, filled with the solution of salt water, in the remainder of the salt water solution in the container or washboiler, baling out the water in the boiler if it comes higher than within 3 inches of the tops of the bottles. After all the bottles have been placed in the container and the solution in the container stands about 3 inches from the tops of the bottles, pour enough salt solution into the bottles so the solution inside and outside stands at exactly the same height, this height being about 3 inches from the tops of the bottles. This pouring is best done with a funnel, so there will be no splashing on the dry outside parts of the bottles. Connect all the inside solutions in the bottles by means of some suitable conductor. Perhaps as simple a way as any is to use one long

(Continued on Page 889)

The Telegraph Situation

TO the unbiased observer it appears rather strange that the wire telegraph in this country has made very little progress for almost two decades, at least as far as the great commercial companies are concerned.

It is also a proven fact that most new telegraph inventions as fast as the patent office pours them out, are bought up by the great companies and then "shelved," which is a great deal cheaper than building new apparatus and new equipment.

Considering this can we wonder when a really meritorious invention, such as the Delany automatic system of telegraphy is put in actual use, that it should be assailed and assaulted from all sides?

Thus the Telepost Company, the independent telegraph, which controls and uses the Delany automatic system, has recently met with considerable adverse criticism.

The following abstract from "The Railroad Man's Magazine" (published by the Frank A. Munsey Company), speaking of the capacity of the Delany system to serve the commercial needs of the country, is illuminating in view of recent newspaper and magazine comments:

"Even a thousand words a minute is one hundred and eleven times as fast as an average operator can send; and, be it remembered, ninety-eight and a half per cent. of the telegrams transmitted in the United States to-day are sent in the same old primitive way that Morse taught.

"Delany does not have to depend upon any flimsy testimony to prove that he can send messages at this incredible speed. In the first place, he has the Elliott Cresson gold medal, conferred upon him by that venerable and distinguished scientific body, the Franklin Institute, of Philadelphia, in recognition of his achievement. He has also a report of the Committee on Science and Arts, signed by the chairman of the committee and the president and secretary of the institute, and bearing its seal certifying that the committee, after due investigation, found the apparatus capable of transmitting and receiving over a single wire twelve hundred words a minute."

The above was written prior to 1910 and the percentage of hand transmitted messages given, therefore (ninety-eight and one-half per cent.), would now have to be revised. A recent statement of Telepost business shows an increase of 140 per cent. at the Chicago offices and 139 per cent. at the St. Louis offices for the last six months of 1910.

The month of January, 1911, showed that there was on the whole Telepost system, including the offices at Chicago, Louisville, Ky., Indianapolis, Terre Haute, Omaha, Sedalia, Kansas City, Springfield, Ill., St. Louis, Boston and Portland, Me., a total increase of 289 per cent. over the corresponding month in 1910.

In the St. Louis offices the increase for January, 1911, over January, 1910, was 904 per cent.

In its last analysis, there is but one infallible test of the "commercial success" of a public utility and this is to be found in the extent to which it is utilized by the people to whom it is available. This statement of increase therefore would seem to be a final unassailable refutation of the recent press assertions that the Telepost is not a "commercial success."

It would be interesting to know to just what extent these assertions were inspired by the steady increase of Telepost business.

EDISON TAKES A VACATION.

How many of us would work 22 years without taking a vacation? It is doubtful whether any of our readers will answer in the affirmative to this query.

Thomas A. Edison, the Wizard of Menlo Park, and who may be justly recognized as the greatest man in the electrical field even to-day, sailed on the Mauretania, August 2nd, 1911, entering on his first vacation which he has had in 22 years. He has made plans to do extensive motoring through France principally and also the other adjacent countries. While each winter he takes a hurried trip to Florida, gaining a brief respite from his factory and laboratory work, this can hardly be considered a real vacation.

High Powered Condensers

By Frank C. Perkins.

THE coil and condenser equipment shown in the accompanying illustration, Fig. 1, for wireless telegraphy was designed and constructed at Fribourg, Suisse, and is of the Mosciki type of the Societé Générale des Condensateurs Electriques. The construction of the tubes in this condenser is seen in drawing Fig. 2, while Fig 3 shows the arrangement of a battery of 6 tubes for laboratory service, this construction being employed for capacities from .0038 to .0260, utilizing from 2 to 8 tubes measuring from 850 mm to 1250 mm in height. The larger condenser batteries for a maximum voltage of 20,000 to 50,000 volts and designed for capacities from .0018 to .0050. It will be noted that the condenser seen in Fig. 1 has 16 tubes of this construction surmounted by coil and spark gap. The accompanying illustration, Fig. 4, shows the wireless telegraph equipment at the Eiffel Tower in Paris with a battery of condensers of the Mosciki type of 0.8 mf. for 110,000 volts.

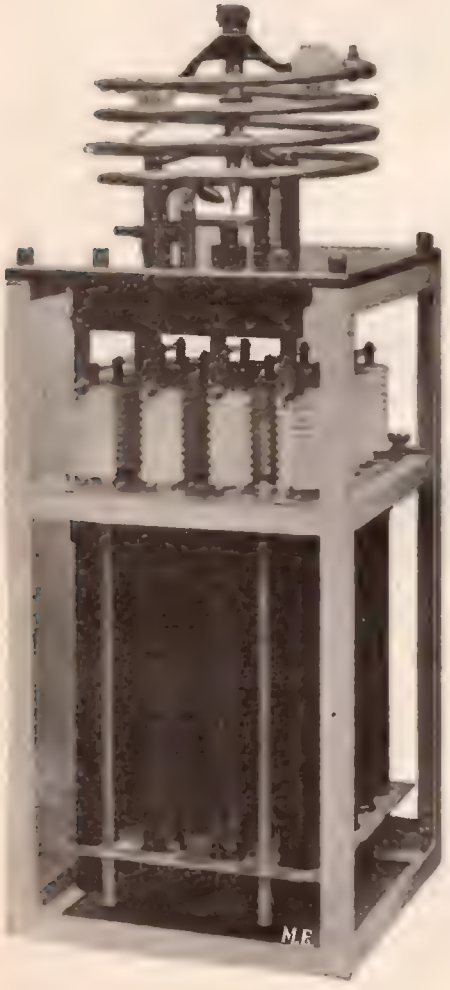


Fig. 1.

Fig. 4.

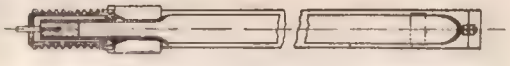


Fig. 2

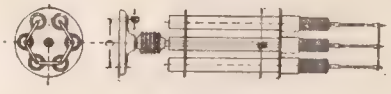


Fig. 3

A GREEN WRAPPER

means your subscription expired. Better renew to-day and you won't miss important numbers.

New Electrical Appliances

AN ELECTRIC SIGN PROJECTOR

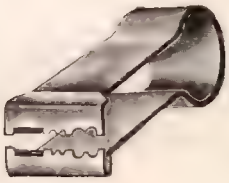
A new method of advertising has been devised in the form of an electrical projector. As shown in the illustration, the apparatus consists of a long tube, containing the necessary lenses, a

powerful electric light, and the stencil of the advertising matter to be projected. The machine is placed in the show window of a store, or other convenient place, and the image cast on the sidewalk. With the lettering bril-

liantly displayed on the sidewalk, it cannot fail to attract the attention of the passers-by. This is probably one of the cleverest and least expensive advertising mediums yet placed on the market, in the line of electrical devices.

A WIRE SKINNER.

A long-felt want has at last been satisfied, with the appearance of the P. & G. Wire Skinner.



It is a simple tool, consisting of a steel strip bent over until two jaws, which are sharpened, are produced. These are so shaped that the copper wire will fit within them without being cut, but the insulation will be taken off. In the two accompanying cuts, both the tool and the method of operation may be seen. The wire skinner will work equally well both on stranded or solid copper wires. The saving in time, the

commodity, the absence of weakening cuts or scratches in the copper wire, the neatness of the clean-cut insulation, the size of the tool, are only a few of the more important advantages.

A NEW WIRELESS CLUB.

The attention of the readers is called to the formation of a new wireless club in the town of Madisonville, Ohio.

The officers are as follows:

John Mackie President.

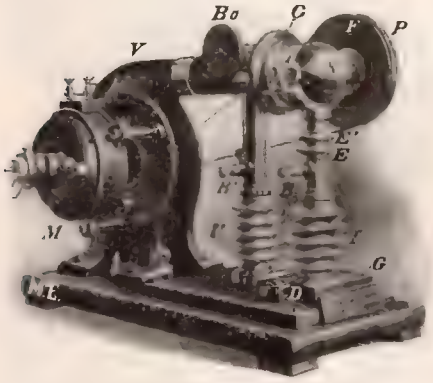
Asbury Shumard, Secretary and Treasurer.

All living in the vicinity or in the town of Madisonville, Ohio, are cordially invited to correspond with the secretary, so that the club may be extended and increased in size.

Paris Letter

DUCRETET ROTARY SPARK GAP.

The illustration shows a latest type of rotary spark gap brought forth by the Ducretet people of Paris. Here, the ball electrode (copper) S, rotates before a cylinder (hollow end) electrode, made of aluminum, and held at C. C rotates also and is on ball bearings. The adjustment



is made at the point Bo, while a small blower, M, serves the joint purpose of rotating the electrodes as well as to feed a steady blast of air to cool the gap. The rotary gap is used extensively in France, where continuous researches are being made to invent even more efficient types.

A NEW PYROMETER.

The photograph shows a pyrometer designed by M. Charles Fery, of Paris. Contrary to the general procedure with pyrometers, the instrument is not placed

in contact with the flame, but at a distance. The heat is measured by observing the heat rays sent out at a distance, and a reading is obtained from a thermo-galvanometer in the instrument, thus determining the heat of the furnace. The illustration in this instance, is taken at the Sèvres Porcelain Works in France, where intense heat is employed in the manufacturing process.

LONG RANGE POTENTIOMETER

While potentiometers are largely connected with wireless receiving instru-

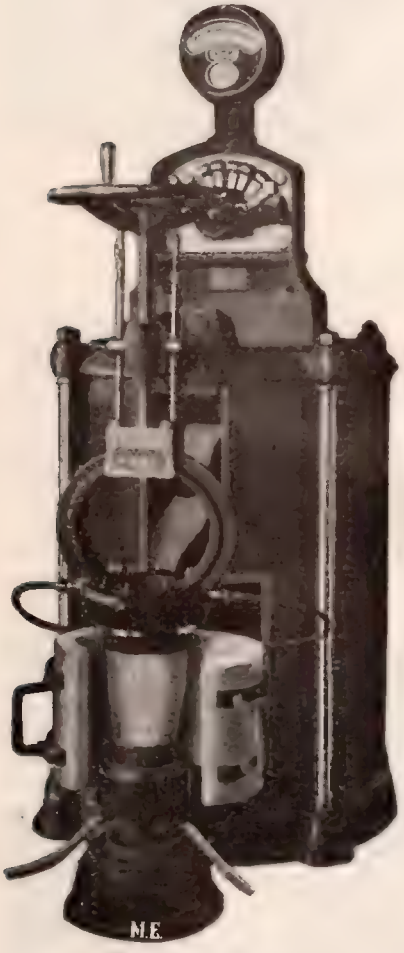
ments, they are used also in measuring tests, but are of a much finer manufacture for this purpose. The instrument illustrated in the photograph contains 150 coils, .01 volt, and protected slide wire. The coils are wound with specially selected manganin wire, adjusted to one ohm, and the slide wire is gilded to prevent oxidation. All the parts are carefully prepared to prevent dampness from effecting them, and as an extra security, a special device is provided for taking care of the dampness which may get into the box.

AN ELECTRIC FURNACE.

A new phase in electric furnaces is il-

lustrated in the photograph before us.

Here, the arc method of obtaining intense heats is not resorted to, but instead we note that a graphite crucible is used for the double mission of holding the melted metal as well as to serve as a conductor for the current. The apparatus comprises a transformer, and two clamps which hold the crucible in place, one at the top, and the other at the bottom, passing the current through the entire heighth of the crucible. A measuring instrument and a rheostat control complete the out-



fit. Intense heats are obtained and it is possible to melt substances within a very short interval of time.

REFLECTING ELECTRODYNAMOMETER.

This illustration shows a highly sensitive A. C. galvanometer of English manufacture, for measuring minute pressures, currents and powers. It may be used in any instance where a highly sensitive instrument for measuring weak currents is desired.

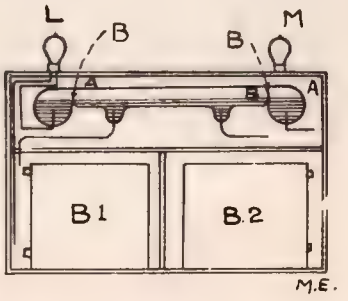
This instrument is provided with three windings and may be used with condens-

ers of any capacity. By suitably adjusting the connections an enormous range of voltage or capacity can be secured. Thus any voltage between 200 volts and 20 millivolts and any capacity down to 10 to the 6th power microfarad, can be measured.

AN AEROPLANE WARNING DEVICE.

Among the many aeroplane fatalities which have seriously resulted in the loss of lives, a large portion of these are directly due to the aviator volplaning at too steep an angle, or perhaps ascending at too steep an angle, which is equally as disastrous.

A warning device, electrically operated, has been produced, whereby two lamps light alternately, showing that the aeroplane is inclining beyond a fixed degree of safety on either side. It consists of a glass tube, A, filled

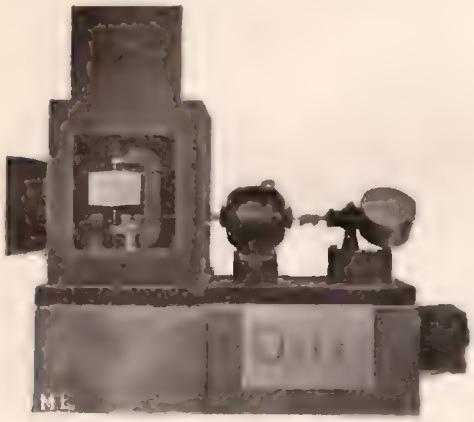


with mercury, B, and subdivided into compartments. Various wires come

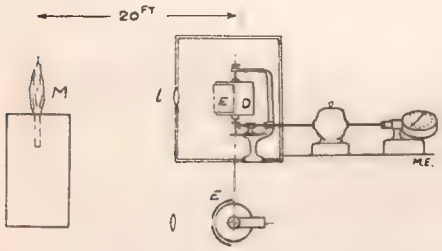
through the glass tube as illustrated. Two sets of battery are also provided and two lamps. When the aeroplane inclines too far in one direction, the lamp on that particular side is caused to light by the current being closed.

APPARATUS TO MEASURE DURATION OF FLAME OF EXPLOSIVES.

The explosion of fire-damp and carbon powder (coal) depends on the speed of the detonation, maximum heat, and the length and duration of the flame. The



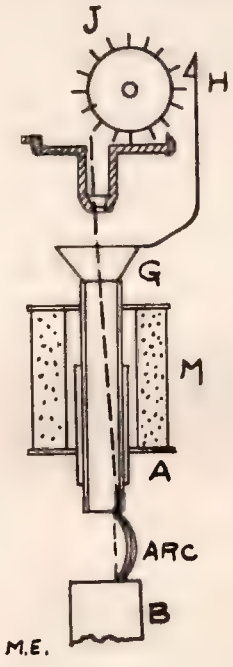
apparatus shown in the illustration measures the flame at night by means of a rotating drum, driven by means of an electrical motor. Drum, D, has screen, E. The light is allowed to enter into the box containing the drum of sensitive



paper, through a quartz lens. The drum being revolved at top speed, catches the flame from the explosive for an instant. The longer the streak on the drum, the longer the duration of the flame. A dynamometer giving the revolutions of the shaft, gives one of the factors for determining the length of explosion.

A NEW ARC LAMP.

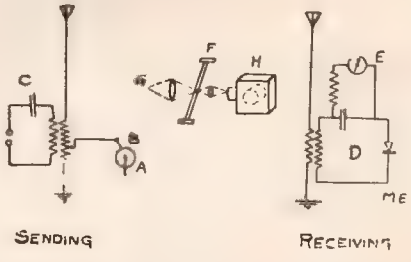
A novel idea in arc lamps is illustrated in the sketch herewith, in which we find an electrode in magnet M, which moves slightly up or down, and pawl H, works wheel J, which in turn feeds down powder. This may be either a suitable powder or liquid, which falls through the



tube of the top, A, electrode. This upper electrode may be of copper, while the lower one, B, is considerably broader. The results of feeding certain powders or liquids to the arc are noticeable in the quality and steadiness of the light.

TRANSMITTING PICTURES WIRELESSLY.

The diagram shows the method used by Dr. Korn for the sending of pictures by wireless means. There is a half-tone metal contact drum, A, B, which is used



to make and break the wireless circuit, C. At the receiving end the detector circuit, D, operates the galvanometer, F, which has a metal strip, to reflect light on a screen. The film moves slowly as the light is projected into the box, H, while the apparatus, F, consists of a curtain shutter.

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EDITORIAL.

We reprint below an Editorial taken from the *New York Times*:

"Young men who are pondering the question whether they will seek a classical or a technical and scientific education will hardly hesitate, of course, if they wish to shape their careers toward money-making. In the history of the country's industries there has never been so pronounced a demand for the services of technical experts. The biggest "plant" for the utilization of water power in the world is now being erected in California upon the fork of the Feather River. Its main reservoir, said to be double the capacity of the Ashokan Reservoir, which will send down 500,000,000 gallons daily of potable water to this city, is also twice as big as the Roosevelt irrigation dam in Arizona. This mammoth work, built by the Great Western Power Company, will be followed by the erection of a chain of additional power plants representing an investment of $20,000,000 and furnishing ceaseless energy equivalent to the work of half a million horses. All of this power will be salable when developed, and after the water has passed the last link in the chain of power plants at Las Plumas, it will be utilized for irrigation projects.

"Works for the transmission of electrical power from waterfalls are transforming the facilities for industry everywhere in this country. "White coal," which is cheap and exhaustless, is vying as a generator of power with the black coal of mines. But great central power plants are being erected, too, at the mines and upon the sites of peat deposits to supply cheaper power by like methods of transmission. In such enterprises the need of the work of skilled engineers is paramount. The process of harnessing the energies from water and from the fossil vegetable deposits of this country will proceed for at least a generation; after that, the gear must be kept in repair. Young men who are training themselves to be engineers should have splendid opportunities."

This is exactly in line with the views of the Editor, who, for years has urged *Modern Electrics* readers to take advantage of the many offers of the correspondence schools of this country.

Few readers realize how much can be learned through a correspondence school course. It should always be borne in mind that the majority of these schools not alone spend fortunes to map out their courses with which to train scholars in a minimum of time, but that most of them command some of the best talent in this country.

Most of the modern up-to-date correspondence schools are specialists in their field, and have given their subject much time and thought. It is very much harder for a correspondence school to keep its scholars than for the regular school and for this reason the modern correspondence schools are to be congratulated all the more, as the majority of them not only hold their own, but are making tremendous strides year after year.

Our readers are especially invited to patronise the schools which they see advertised in our columns, and they may rest assured that only reliable firms, which are fully responsible, are admitted to our advertising columns.

Ralph 124C 41 +

(Continued.)

By H. Gernsback.

SYNOPSIS OF PRECEDING INSTALLMENTS

Ralph 124C 41+ living in New York in the year 2660 while in conversation with a friend at his Telephot, an instrument enabling one to see at a distance, is cut off from his friend and by mistake is connected with a young lady in Switzerland, thus making her acquaintance by Telephot.

The weather engineers in Switzerland who control the weather decided to strike against the Government and turned on the high depression of their Meteoro-Towers, thereby snowing in a large district. An avalanche threatens to sweep away the house in which the young Swiss lady, Miss 212B 423, lives and she appeals to the great American inventor, Ralph 124C 41+, to save her, which he promptly does by melting the avalanche by directed wireless energy from his New York laboratory.

The inventor on the same afternoon is given an ovation by distance, in which the Telephot plays a great part. Afterwards he reads a "newspaper," the size of a postage stamp, and "writes" a lecture by means of the Menograph, an instrument by means of which words are made to appear on a paper tape by impulses from the brain acting on the apparatus. During the night his head is connected electrically to the Hypnobioscope, an instrument by means of which words and sentences are transmitted directly to the brain while one sleeps, in such a manner that everything can be remembered the next morning.

The great inventor, the next day, is visited by Mr. 212B 423 and his daughter from abroad. Both arrived by means of the Subatlantic Tube, piercing straight through the earth from New York to Brest in France. In the afternoon in presence of his guests and twenty professors from all over the globe, 124C 41+ brings life to a "radiumized" dog, who had been killed three years previous in presence of the twenty professors. The dog had been preserved with the rare gas Permagatol and Radium-K bromide, which latter occupied the blood vessels of the dog for three years.

124C 41+ then proceeds to show Miss 212B 423 wonderful New York. Both put on "Tele-Motor-Coasters," propelled by wireless energy and roll about the town. They then visit the new electric restaurant; the "Scientificafe," and enjoy a lunch of semi liquid food, supplied through tubes. Afterwards they see the monument of the last horse to die in harness in New York A. D. 2096

THEY rolled on for a while and Miss 212B 423, who saw one new wonder after another, kept her companion busily engaged answering questions, which duty he performed eagerly and enthusiastically.

Being much interested in sports, she desired to know presently how the modern New Yorker limbered himself up and for his answer 124C 41 *presently* stopped at a corner and they entered a tall, flat-roofed building. They took off their coasters and then stepped into the electromagnetic elevator and *then* ascended fifty odd stories in a few seconds. At the top, they found a large expanse on which were stationed dozens of fliers, small and large. There was a continuous bustle of departing and arriving aerial fliers and of people alighting and departing.

As soon as our friends appeared a dozen voices began to bark: *"Aerocab, sir, Aerocab, this way please!"* 124C 41, unaffected by the barkers, walked over to a two-seated flier and asked his companion to be seated; he then seated himself and after a brief, *"National Playgrounds,"* to the "driver," they instantly departed. The machine, which was very light and operated entirely by electricity, was built of metal throughout; it shot up into the air with a terrific speed and then took a northeastern course at a rate of ten miles per minute.

124C 41 kept on explaining the sights to his companion, and from the great height at which they were flying it was not hard to point out the most interesting structures, towers, and bridges, as well as other scenery.

In less than ten minutes they had arrived at their destination, the National Playgrounds. They alighted on an immense platform and then descended to the ground.

The National Playgrounds, built by the city in 2490, are located at the extreme eastern end of what used to be Long Island, a few miles from Montauk. An immense area has been fitted up for all kinds of sports, terrestrial and aquatic as well as aerial. These municipal playgrounds are the finest of the world and they are one of New York's greatest prides. The City Government supplies all the various sporting paraphernalia and every citizen has the right to use anything and everything, simply by applying to the Lieutenants in charge of the various sections.

There are playgrounds for the young as well as for the old, grounds for gentlemen and grounds for the ladies. There are grounds to romp about in for babies and golf links for the old gentlemen. There are hundreds of baseball fields, thousands of tennis courts, and uncounted football fields. It never rains, it is never too hot, it is never too

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cold. The grounds are open three hundred and sixty-five days during the year, from seven in the morning till eleven at night. After sunset, the grounds and fields are lighted by thousands of Iridium wire spirals, for those whose duties makes it impossible for them to frequent the grounds during the daytime.

As a matter of fact all the great baseball, tennis, and football contests are held after sundown. The reason is apparent. During the daytime, with the sun shining, there is always one team which has an advantage over the other, on account of the light being in their eyes, which blinds more or less,—an old known fact. In the evening, however, with the powerful, stationary light overhead, each team has the same odds and the game can be played with more fairness and accuracy than by sunlight.

124C 41 and his companion walked around for a while watching the players, and it was not long before he discovered that she was an ardent tennis player. This also happened to be his favorite sport. He naturally invited her to a game, which she accepted enthusiastically. They both walked over to the dressing building where 124C 41 kept his own sporting clothes *and apparel.* As his companion had come without her tennis shoes, it was necessary to secure a pair for her in the Arcade, and after she had found a suitable pair, they both went to the Tennis Grounds.

It was a delightful game and although 124C 41 was an expert, his companion beat him almost from start to finish. To be frank, he was not very attentive to the game, as it interested him far less than his fair opponent. He did not see the ball, nor did he notice the net. All he could do was to watch her in rapture and this alone kept him pretty busy.

He had never imagined that a human being could be so swift and graceful all at the same time. She darted hither and thither, she swished from right to left, smiling and beaming all the time. It seemed to him that she never touched the ground; one moment she would be straight up in the air, straight as an arrow, trying to catch an impossible ball; the next second her lithe and wonderful, flexible body would fly almost horizontally over the field after a hopelessly "out" ball. And she always smiled and beamed upon him, no matter what her pose, her white and perfect teeth, glittering in the sunlight, trying to outdo the fluorescent sparkle of her wonderful, tantalizing, ever dancing eyes.

124C 41 under this bombardment of feminine charms became as awkward as never before in his life. He could play mechanically only and as the game proceeded he became more and more confused. It was hopeless. Instead of seeing balls, he saw nothing but waving hair, a set of wonderful teeth and a pair of almost impossible, wonderful eyes which kept him spellbound.

He was almost ready to give up when the remarkable happened.

Miss 212B 423, when she left the house, had of course not known that she was going to play tennis, and for this reason had come to the game without her usual hair-net protecting her heavy hair. It was, therefore, little wonder that suddenly, while jerking her head to catch an extremely low ball, her hair came down without warning. Nor was there any half way about it.

It became unfastened neatly and thoroughly. Down it came, farther and farther; it passed her waist, then her knees and stopped short a foot from the ground. It completely enveloped her, and what hair it was! 124C 41, who was only ten feet away from her, had stopped short as if thunderstruck, completely flabbergasted, as it were. His racket had slipped from his hand and his mouth was far from being closed. He looked anything but intelligent. If he had ever given the subject thought, he would have come to the logical conclusion that a mass of hair, and such hair as he saw now before him, was an absolute impossibility. He would have told anyone that such hair was preposterous, a mad dream of a mad brain.

Presently, however, before his astonished eyes, a pink nose disentangled itself out of the forest of blue-black, heavy hair. Next a dimpled, well rounded pink chin appeared, followed immediately by a blushing, annoyed face, and a plaintive, embarrassed voice complained:

"*How* dreadful, oh what will I ever do . . . . ." but catching sight of our hair-struck young friend, whose face was the very personification of amazement, she burst into a ringing laugh, which to his ears sounded much like church chimes. It furthermore had the beneficial effect of waking him up by bringing him gently

back to earth. Unfortunately, or perhaps fortunately—who knows?—it did not stop there. No indeed. He did not turn his head for the very simple reason that his head had become turned. (This is not intended for a pun.) Consequently, he watched her. The very admiration shining out of his soul by way of his eyes embarrassed her at first, but it quickly wore off, while she began to put up her hair again.

It was not the easiest task either. 124C 41 for the life of him could not see how on earth she was ever going to get it back again in place. Besides he could not understand where all these masses of heavy hair could find shelter and he continued gazing at her, watching every move. Little by little, however, it found its way back and in a short while it once more crowned a queenly head—not in time, however,—for 124C 41 had made a solemn oath that he would never consider himself happy if he could not call himself part owner of that wonderful hair.

For the next ten minutes, he rhapsodized in ardent terms over her hair, and she became so embarrassed that he had to put a stop to it.

"You know," he concluded, "some individuals, like Samson, are conquered by the loss of their hair; and on the other hand, some individuals by the acquirement of other's hair are conquered in turn!"

"Now," he said, having become a matter-of-fact scientist again, "I will show you where New York gets its light and power from."

A few minutes later, after both had changed their shoes, they again were seated in an aerocab and a twenty minutes' fly brought them well into the center of what was formerly New York state.

On alighting, they found an immense plain on which twelve monstrous Meteoro-Towers, each 1,500 feet high, were stationed. These towers formed a hexagon inside of which were located the immense *Helio-Dynamophores*, i. e., Sunpower-generators.

The entire expanse, twenty kilometers square, was covered with glass. Underneath the heavy plate glass squares were located the photo-electric elements which transformed the solar heat *direct* into electric energy.

The photo-electric elements, of which there were 400 for each square meter, were placed in large movable metal cases, each case containing 1600 photo-electric units.

Each metal case in turn was movably mounted on a kind of large tripod in such a manner that each case from sunrise to sunset invariably presented its glass plate to the sun. The rays of the sun, consequently, struck the photo-electric elements always vertically, never obliquely. A small electric motor inside of the tripod moved the metal case in synchrony with the sun's advance in the sky (or more correctly with the turning of the earth around its axis).

In order that one case should not take away the light from the one directly behind it, all cases were arranged in long rows, each sufficiently far apart from the one preceding it. Thus shadows from one row could not fall on the row behind it.

At sunrise, all cases would be almost vertical, but at this time very little current was generated. One hour after sunrise, the plant was working to its full capacity; by noon all cases would be in a horizontal position, and by sunset, they again would be in an almost vertical position, in the opposite direction, however, from that of the morning. The plant would work at its full capacity until one hour before sunset.

Each case supplied a current of about one hundred and twenty kilowatts almost as long as the sun was shining, and it is easily understood what an enormous power the entire plant could generate. In fact, this plant supplied all the power, light, and heat for entire New York. One-half of the plant was for day use, while the other half during daytime charged the chemical gas-accumulators for night use.

In 1909 Cove of Massachusetts invented a thermo-electric sunpower-generator which could deliver ten volts and six amperes, or one-sixtieth kilowatt in a space of twelve square feet. Since that time inventors by the score had busied themselves to perfect solar generators, but it was not until the year 2469 that the Italian 63A 1243 invented the photo-electric cell, which immediately revolutionized the entire electrical industry. This scientist discovered that by suitable materials of the Radium-M class, in conjunction with Tellurium and Arcturium, a photo-electric element could be pro-

duced which was strongly affected by the sun's ultra-violet rays and in this condition was able to transform heat *direct* into electrical energy, without losses of any kind.

After watching the strange plant for a time Miss 212B 423 remarked:

"We, of course, have similar plants across the water but I have never seen anything of such magnitude. It is really colossal. But what gives the sky above such a peculiar blue tint?"

"In order not to suffer too great losses from atmospheric disturbances," 124C 41 explained, "the twelve giant Meteoro-Towers which you notice are working with full power as long as the plant is in operation. Thus a partial vacuum is produced above the plant and the air consequently is very thin. As air ordinarily absorbs an immense amount of heat, it goes without saying that the Heliodynamophore plant obtains an immensely greater amount of heat when the air above is very clear and thin. In the morning the towers direct their energy towards the East in order to clear the atmosphere to a certain extent, and in the afternoon their energy is directed towards the West for the same purpose. For this reason, this plant furnishes fully thirty per cent. more energy than others working in ordinary atmosphere."

As it had become somewhat late both returned to the city, traversing the distance to 124C 41's home in less than twenty minutes.

Miss 212B 423's father arrived a few minutes later, and she explained to him what a delightful time she had had in the company of her distinguished host. They then repaired to the dining hall for dinner.

Shortly after termination of dinner, 124C 41 bade his guests down to the *Tele-Theater*. This large room was fitted up exactly like a theater; the stage, however, was only a few feet deep; but the enclosure and curtain were exactly like those on any up-to-date stage. The rear part of the room had upholstered chairs similar to those in any theater; in fact it was hard to realize that one was not seated in a real playhouse.

After everyone was seated, 124C 41 handed Miss 212B 423 a directory giving a list of the plays and operas that were playing on that night.

"Oh, I see they are playing the French Comic Opera, *La Normande*, at the National Opera to-night: I have heard and read much of it and if you have no objection I should like to hear it."

"With the greatest of pleasure," 124C 41 replied, "in fact, I have not heard it myself, my laboratory lately kept me so busy, that I have missed the Opera several times, already, as it is played only twice a week now."

With this he walked over to a large switchboard-like affair from which hung numerous cords and plugs. He inserted one of the plugs into a hole labeled "National Opera." He then manipulated several levers and switches and seated himself again beside his guests.

As it was early yet, he entertained his guests for a few minutes on various topics. Shortly after, a chime rang and the lights in the room dimmed down gradually. Immediately afterward, the orchestra began and the illusion was so perfect that one was positive that the music originated near the stage, although the National Opera House was four miles distant from 124C 41's house. A large number of loud-speaking telephones were arranged near the dummy stage, and the acoustic effects were such that the illusion was absolutely perfect in all respects.

A few minutes later, the curtain rose—the opera had started! Directly behind the curtain several hundred especially constructed telephots were arranged in such a manner as to fill out the entire space of the dummy stage enclosure. These telephots were connected in series and were all joined together so cleverly that no break or joint was visible in the rear part of the room. The result was that all objects on the distant stage of the National Opera were projected full size on the composite telephot on the dummy stage. The illusion was so perfect in all respects that with the best intention it was extremely hard to imagine that the actors on the dummy telephot stage were not real in flesh and blood. Each voice could be heard clearly and distinctly and as a matter of fact much clearer than in the National Opera itself, because the transmitters were close to the actors all the time and it was not necessary to strain the ear to catch difficult passages.

After the first act 124C 41 explained that each New York playhouse now had over 200,000 subscribers and it was as easy for the New York subscriber to hear

and see the play as for the far-off Paris or Berlin subscriber. On the other hand, he admitted that the Paris and Berlin as well as the London playhouses had a large number of subscribers local as well as long distance, but New York led them all.

"Can you imagine," Miss 212B 423 mused, "how the poor people in former centuries must have been inconvenienced when they wished to see a show? I was reading only the other day how the poor wretches had to prepare themselves for a show hours ahead of time; they had to get dressed especially for the occasion and even went as far as to have different clothes in which to attend theaters or operas. They then had to ride or perhaps walk to the playhouse itself. Then the poor things, if they did not happen to like the production, had either to sit all through it or else go home, because very likely they would not have got seats in another theater even if they had gone there. They probably could not have conceived the ease of our Tele-theaters, by means of which we can switch from one play to another in five seconds, till we find the one that suits us best.

"Nor could their sick people enjoy themselves seeing a show, as we can do it nowadays. I know when I was down with a broken ankle a year ago, my only real diversion was the Tele-theater; I cannot imagine how I could have lived through those dreary six weeks in bed without a show each night. It must have been dreadful to live in those days!"

"Yes, you are right," 124C 41 commented, "neither would they have imagined in their wildest dreams the spectacle I witnessed a few days ago.

"By chance I went down in the elevator, and passing this room I heard such an uproarious laughter that I decided to see what caused this merriment. Entering unnoticed, I found my ten-year-old brother 'entertaining' half-a-dozen of his friends. You would never guess what he had done. The mischievous rascal had gone and plugged into 'Romeo and Juliet' playing at the Broadway—in English of course. He then plugged in at the same time into *Der Spitzbub*, a farce playing in German at the German Theater and to this, for good measure, he added *Rigoletto* in Italian, playing at the Gala in Milan.

"The effect was of course tremendous. Part of the time, nothing but a Babel of voices and music could be heard; but once in a while a single voice could be heard, followed immediately by another one in a different language, and so on. The funniest one no doubt was when at the Broadway, Juliet calls: *Romeo, Romeo, where art thou, Romeo?* For an answer some fat actor at the German Theater howled: *Mir ist's Wurst Schlagt ihn tot!*

"Of course, everything on the stage was blurred most of the time, but once in a while extremely funny combinations resulted between some of the actors at the various theaters, and these invariably were greeted with an uproar."

* * * * * * *

La Normande proved to be a very good show for our friends and they heard and saw it in its entirety. After the close of the last act, 124C 41 bade his guests down and after everybody had attached his tele-motor coasters, the genial host proceeded to show his guests New York by night.

(To be continued.)

ATTENTION OF THE MEMBERS OF THE WIRELESS ASSOCIATION OF AMERICA.

We have been requested by Mrs. Edith Dunham, of 216 West 111th Street, New York City, to announce to the members of the

Wireless Association, that her son, Donald Dunham, has disappeared from home. He was a member of the association, and an ardent experimenter in electricity.

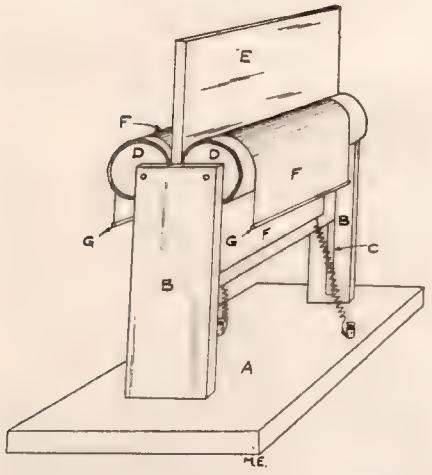
(Continued on Page 386)

This department has been started with the idea to encourage the experimenter to bring out new ideas. Every reader is welcome to contribute to this department, and new ideas will be welcomed by the Editors. WHEN SENDING IN CONTRIBUTIONS IT IS NECESSARY THAT ONLY ONE SIDE OF THE SHEET IS USED. SKETCH MUST INVARIABLY BE ON A SEPARATE SHEET NOT IN THE TEXT. The description must be as short as possible. Good sketches are not required, as our art department will work out rough sketches submitted from contributors. IT IS THEREFORE NOT NECESSARY FOR CONTRIBUTORS TO SPEND MUCH TIME IN SKETCHING VARIOUS IDEAS. When sending contributions enclose return postage if manuscript is to be returned if not used. ALL CONTRIBUTIONS APPEARING IN THIS DEPARTMENT ARE PAID FOR ON PUBLICATION.

FIRST PRIZE TWO DOLLARS.

A NOVEL CONDENSER.

This variable condenser is quite convenient to use in connection with a semi-variable condenser where the glass plates are very large, as after cutting in or out the proper number of plates, the adjustment may be brought to a very fine point by moving the movable glass plate up or down.



The construction may be clearly seen in sketch.

A is suitable wood base. B. B. are wooden uprights with grooves, C, on the inner sides. D. D. are wooden rollers—pieces cut from a curtain pole are excellent—covered with felt or several layers of soft cloth. E is glass plate of proper size to move freely in grooves, C. F. F. F. is tinfoil an inch less in diameter than the glass used. G. G. are metal rods to counterbalance the glass plate.

Fasten the rods used for counterweights to one side of each piece of tinfoil and then glue the opposite side of each piece along a strip of one-half inch on opposite sides of glass plate, the right distance from edge, and next give the rest of the plate that is to come in contact with the tinfoil a coat of petroleum jelly and the plate is ready to insert between the rollers, as shown in sketch.

The rollers must work smoothly and press tinfoil and plate firmly together. After adjusting plate connect a piece of fine wire, coiled spring fashion, to tinfoil on each side and opposite ends of plate and bring the other ends down to two binding posts on base and the condenser is complete.

To operate push plate down or pull up, thereby causing tinfoil to adhere to or strip from plate, till the point for best results is found.

Contributed by

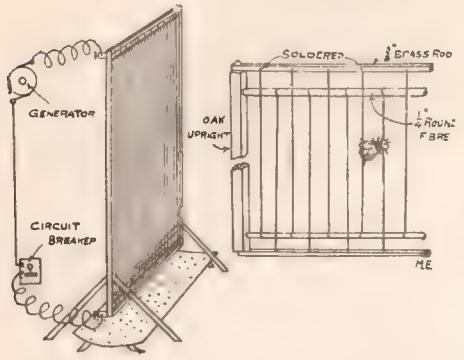
R. S. TRUE.

SECOND PRIZE ONE DOLLAR.

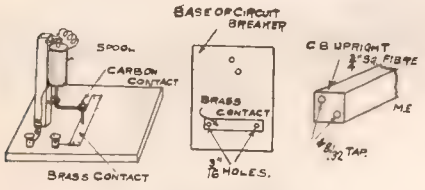
AN ELECTRIC FLY-KILLER.

Herewith is a description of an electric fly-killer. The diagram can be varied according to the maker's liking. The wires used should be iron or copper No. 16 or 18 bare, separated one-eighth of an inch. Note one set of wires are connected from one brass to one fibre rod. A suitable receptacle should be placed under the screen to catch the dead flies. The apparatus may be connected to 110 V., D. C.

or A. C. A suitable circuit breaker must be provided to extinguish the arc which forms by a fly shorting the wires. A simple circuit breaker may be constructed by referring to the diagram. A thread



spool wound with 18 S. C. C. wire mounted on an upright and using an iron rod in the center serves the purpose admirably as the solenoid. The extension holds a carbon contact which touches a brass contact on the base. When a fly alights

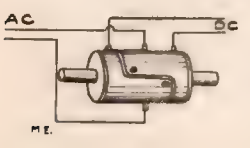


on the screen the current immediately kills him and when he falls usually an arc forms, which is extinguished by the circuit breaker. This performance does not register on the meter.

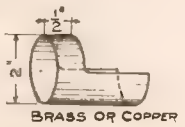
Contributed by
E. W. HUTCHINSON.

HOW TO CHANGE D. C. TO A. C.

Secure a wooden cylinder, 5 inches long and 2 inches in diameter. In its center fit a small shaft as shown in Fig. 2. Now from some brass or copper tubing, of the same diameter as the cylinder, cut two (2) pieces as



-FIG 2-



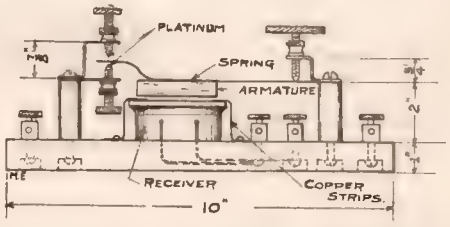
-FIG.1-

shown in Fig. 1. The dimensions may be changed but the above will prove satisfactory. The two pieces are mounted on the cylinder with flat-headed screws. Between the two pieces an air gap of one-eighth inch is left. This space is filled with mica. The brushes are of the same material as the commutator, and they should press firmly and evenly on the commutator segments, they should be in the same position as shown in Fig. 2. The cylinder is mounted on suitable bearings and is belted to a small motor (a battery motor will do). The amount of power required will depend on how hard the brushes bear on the commutator. To tell if the current is direct or alternating, hold a small Permanent Magnet (an electro-magnet will not do) near a bulb, which is lighted by the current to be tested. If direct the filament will be drawn or repelled by the magnet, and if alternating the filament will vibrate.

Contributed by H. W. H.

NOVEL RELAY.

This relay is a very sensitive instrument, and it all depends on the sensitiveness of your phones. If you have a pair of 4,000-ohm phones you can make a very nice relay. Set your telephone receiver (one of them) in a strip of wood. Now mount two brass or copper standards, and fasten to one brass standard a brass spring. Now rivet or solder an



iron armature so that it is right over the phone. At the end of this, solder a little copper strip with platinum on the end. On the other standard put two strips of copper tapped to receive screws also tipped with platinum. Now on top of the spring bearing the armature put a strip of copper with a set screw or thumb nut for regulating the distance of the armature over phone. Provide four binding posts and connect the same as any other relay. For other details see drawing.

Contributed by E. BURKE.

(It sounds good, but will it work?—*Editor.*)

World Radio History

HIGH PITCH SPARK PRODUCER.

Experimenting the other night trying to find how to raise the pitch of my spark, I accidentally touched the vibrator with a pencil just below the bridge. This raised the pitch of the spark to such a clear tone that I took a piece of ⅛ by ¼ inch brass and bent it in the shape shown in

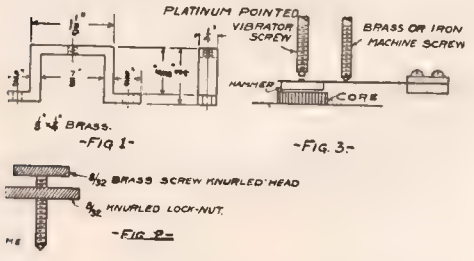


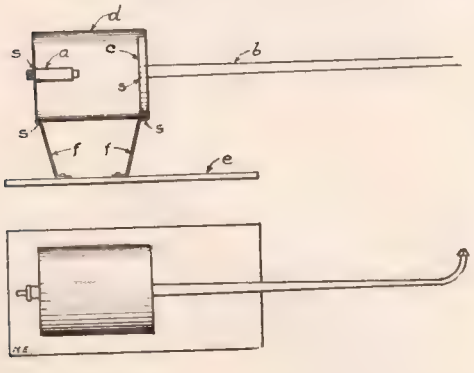
Figure 1. I then bored and tapped a hole in the top of this piece for an 8/32 machine screw. Screwing this piece of brass on the front of my coil and running an 8/32 screw with a lock-nut through the hole in the top I adjusted the screw, getting a very high-pitched clear tone to my spark.

Contributed by
ROBERT E. SMITH.

AN IMPROVED BLOW-PIPE.

Following is description of an improved blowpipe which I have made.

A rubber-cement can (d) is first cleaned and holes drilled in the lid and bottom to receive (a) a bicycle valve and (b) a common jeweler's blowpipe, which



are soldered at s-s. The lid (c) is now pounded down tight and soldered. A base (e) is now made of thin wood, and standards (f-f) of thin sheet iron. The standards are bent as shown and soldered at (s-s) and nailed to the base. The lower ends of the standards should point inwards as shown. The reason for this is that you can adjust the height of the open end to fit the lamp.

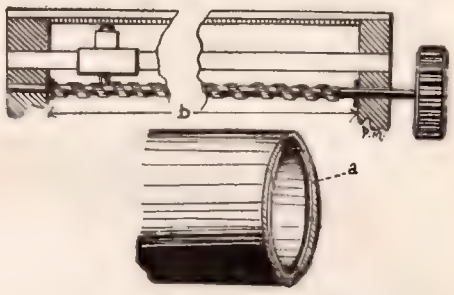
Pulling the can backwards will raise the end of the blowpipe and pushing it forwards will lower it.

A bicycle pump is used to do the blowing.

Contributed by
OSCAR E. TWINGREN.

IMPROVEMENT ON LOOSE-COUPLED TUNING COILS.

In the ordinary loose-coupled tuning coil, when the secondary has been pushed entirely into the primary the slider on the former cannot be moved. The device shown in the illustration has been designed to remedy this defect. In this device the slider, instead of sliding outside the coil, slides inside of it. It is made to run to-and-fro by means of an old auger bit, one that has a straight shaft running through the middle. The ends of the worm are



filed around the shaft, so that its length (the worm parts) will be one-eighth inch less than "B." This space (one-eight in.) is taken up by two thrust washers, as shown. The head of the bit is broken off, and a pin on the slider engages with the worm.

In order to be able to use this device on a coil, the latter has to be wound in a special manner. This is shown in the lower illustration. The wire, instead of being wound over a solid cardboard tube, is wound over a slotted one, and is covered by another tube to protect it. The slot is for the purpose of letting the slider touch the wire, ("A") which should be bared at that place.

Contributed by P. MERTZ.

HELIX INSULATION, WATER RESISTANCE, AND BATTERY ECONOMIZING.

Although many ways have been suggested for insulating the helix, I firmly

believe that the less insulation necessary, and used, on this instrument, the better. Suspend the coil of helix wire from the ceiling by means of stout cord, and glazed porcelain cleats, as per diagram, and thread the ends of it to take binding posts for special connections. This method eliminates all wooden frame-work, etc., and will prove quite efficient for the largest of stations.

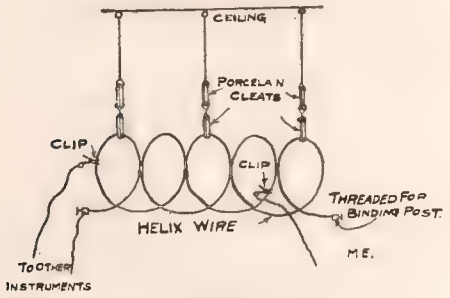


FIG. 1.

Being in need of a good resistance to cut down my 110-volt current, and having on hand one of the E. I. Co.'s electrolytic interrupters, I fastened an insulating knob to the end of the brass rod, removed the porcelain tube, and poured a solution of salt and water into the glass jar. By experimenting with the brass

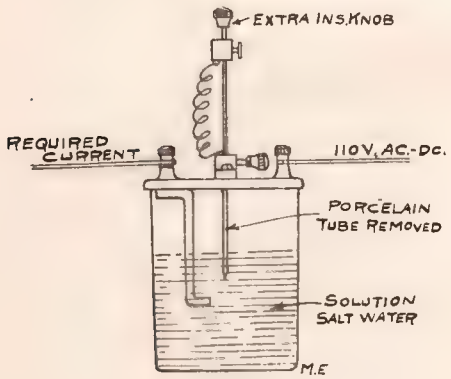


FIG. 2.

rod I found a place where it allowed the required amount of current to pass, and I clamped it there by means of the thumbscrew. By varying the strength of the solution, and the height of the rod, any voltage from 1 to 110 may be obtained.

Varying battery strength by using resistance in series is an extremely wasteful process. To avoid it place some wet cells upon a base, to which are fastened two uprights, as shown in the diagram.

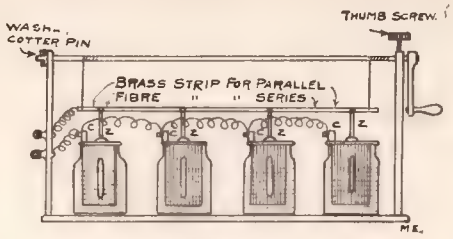


FIG. 3.

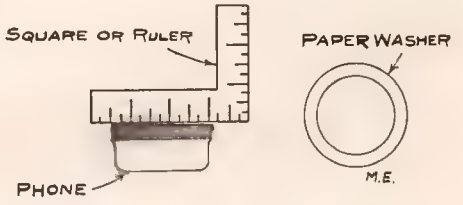
Through two holes previously bored in the uprights, pass a shaft with a crank on the end. Fasten a brass strip to the zincs, and run a cord from each end of this strip to the shaft. By revolving the crank, the zincs are drawn up out of or let down into the solution, thus varying gradually the flow of current. By means of a thumbscrew, clamp the shaft fast in any desired position.

Contributed by

E. JAY QUINBY.

INCREASING THE SENSITIVENESS OF RECEIVERS.

75-ohm phones can be made three or four times as sensitive by the following



method.

First, scrape all the enamel off the diaphragms.

Second, file off the hard rubber around the coils where the diaphragm sets, until the diaphragm comes to within 1/32 of an inch of the coils, testing with a ruler or square as you file it off.

If you should get too much filed off one piece or more of thick paper, cut in the shape of a washer as big as the diaphragm can be used to build up.

I would not advise anybody to try it on expensive phones as it might spoil them.

Contributed by

EARL CLIFFORD.

AN INDEPENDENT VIBRATOR.

Articles required:

1 good bell magnet.

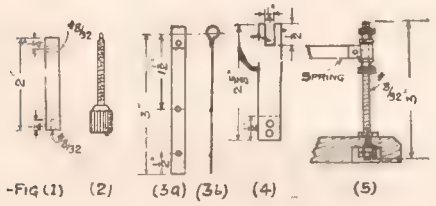
1 piece clock spring, 3 inches long.

1 piece of threaded brass rod (8/32), 3 inches long.

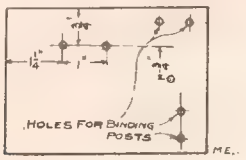
2 pieces of brass rod, ¼ inch square, each 2 inches long.

2 pieces of threaded brass rod (8/32), each 1½ inches long.

1 piece of sheet brass, 2⅝ inches long and ½ inch wide.



-FIG (1) (2) (3a) (3b) (4) (5)



-FIG. 7-

1 piece of silver wire (No. 16).

2 electrose knobs (8/32 bushing).

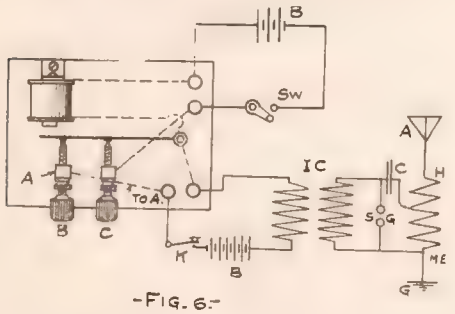
4 binding posts.

Drill and tap the 2 square rods as shown in Fig. 1.

Drill a small hole in the end of each of the two 1½-inch threaded rods.

Now into each hole hammer a piece of silver wire, ¼ inch long. Now screw an electrose knob tightly onto the other end of each rod, Fig. 2.

The clock spring should be a piece cut off the end so that you get the loop (3b).



-FIG. 6-

Drill holes in spring as in Fig. (3a).

Now hammer into each of the holes a piece of silver wire, ¼ inch long.

Drill and slot magnet support as in Fig. 4.

The spring is held between 2 battery nuts on the 3-inch threaded brass rod, Fig. (5).

2 battery nuts are used as lock-nuts on the adjusting screws.

Assemble as shown in Fig. 6 and 7.

Connect as shown by dotted lines in Fig. 6.

Adjust the screw (c) till you get the highest tone vibration, then set it with the lock-nut.

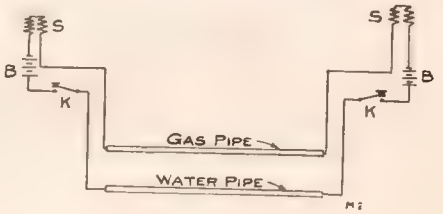
Then adjust the screw (B) till you get the best spark.

Contributed by

HAROLD J. FARRAR.

ANOTHER SYSTEM OF WIRELESS TELEGRAPH AND TELEPHONY.

Many boys living near or within two city blocks of one another, have a great desire to build a telegraph or telephone line, but they soon find trouble in getting permission to swing their wires over their neighbors' houses and even then, if they do get that permission, there is always great trouble in keeping their wires in repair. Something prevents their building a regular wireless so that the idea is dropped, but I think with the following help the idea will not have to be dropped.



If the water and gas pipes are tapped at each end of the line as shown in Fig. 1, and wires from them connected to the telegraph instruments, or (if the line is to be telephone, to one of the Electro Importing Company's telimphones), the pipes may be used as if they were overhead wires.

Although the pipes lie un-insulated in the ground they do not short circuit to any great extent.

One disadvantage is that as the pipes are of high resistance a number of batteries have to be used to work a sounder a block and a half away, usually six or seven cells, but if this system is confined to one block it will work perfectly.

It takes but 3 to 4 dry cells to work a sounder from one end of an average city block to the other.

World Radio History

Telimphones work well on one block, but the right number of cells for them should be found by experimenting.

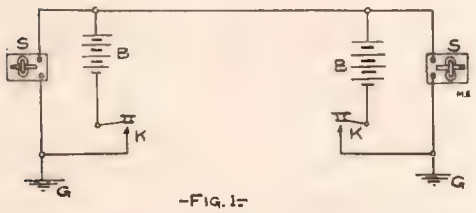
Contributed by

JOHN B. BRADY.

AN OPEN-CIRCUIT TELEGRAPH LINE.

Perhaps many persons have tried to operate a telegraph line and have obtained poor results because closed-circuit batteries were not used. It is evident that ordinary open-circuit batteries will quickly run down if used on closed-circuit lines.

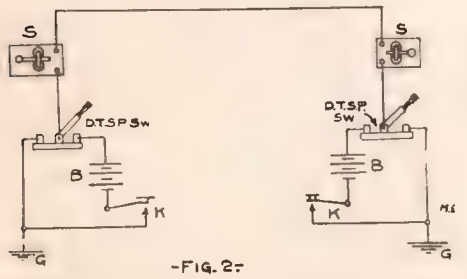
The writer and a friend have in opera-



-FIG. 1.-

tion an open-circuit telegraph line, so arranged that either person can call the other at any time. Fig. 1 shows the connection used. This system gives excellent results when the two sounders are of the same resistance and the line is a short one. It is evident that this system will not give good results on long lines, having high resistances, as the drop of potential along the line will be so great that the distant sounder will be acted upon by only a small portion of the voltage of the battery, thus giving a weak impulse.

For long lines the series connection



-FIG. 2.-

shown in Fig. 2 is very satisfactory. This system of connection can be used equally well on a short line. The chief disadvantage of the series system when used on a short line is that about 4 times as many batteries are needed to overcome the resistance of the two sounders, than are needed when the same two sounders are connected according to the parallel method. This disadvantage can be overcome by using sounders of low resistance (5 ohms) when the series system or method of connection is used. Another advantage of the parallel system is that there are no switches to operate.

In either system of connection the sounders should be of the same resistance and preferably of the same construction.

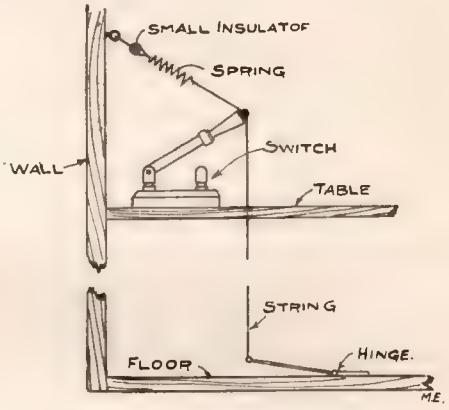
Contributed by

K. ORMISTON.

A "FOOT" SWITCH.

How many have tried to work a piece of apparatus, with their two hands, and the switch, at the same time? I find the switch, whose description follows, to be very handy in a case of that sort.

An ordinary switch is mounted on the work bench close to the wall. A small hole is drilled through the wooden handle, from which a heavy cord (fish line is good) runs through a suitable slot in the table to a pedal on the floor.



A spring is so fastened to normally hold the switch up, or "off," see Fig. 1.

The pedal is a board, 5 or 6 inches wide and about 10 inches long. One end is hinged to the floor. This pedal must move freely.

When current is required press on board with foot. When through remove foot and switch springs back to "off."

If this apparatus is used on the 110 volt circuit place a small insulator as in Fig. 1.

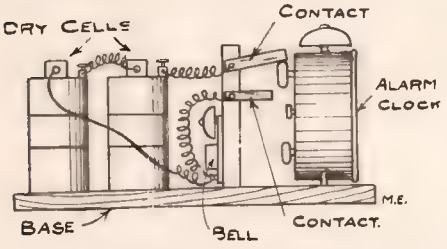
Contributed by

HAROLD L. KESSLER.

AN ELECTRIC ALARM CLOCK.

The following is a simple electric alarm bell, made without defacing a good alarm

clock: Wind up your clock and set the time of your alarm the same as usual. Put the clock on the wooden base and rest the metal arm (iron or steel preferred) on the alarm wind. When the time comes for the clock to ring, the



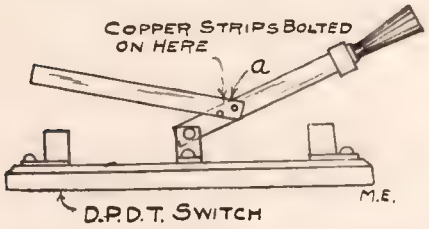
alarm wind quickly revolves, and the metal arm falls onto the steel spring, making an electrical connection. The remainder is wired according to the illustration.

Contributed by

WM. M. GRANT.

A QUICK THROW SWITCH.

Here is a drawing of a quick action aerial switch. First get a D. P. D. T. switch. Two holes (about one-eighth of an inch diameter) should be drilled in blade of D. P. D. T. switch at "a". Some copper strip (or brass) about three-eighths of an inch wide by one-sixteenth



of an inch thick is needed. Inasmuch as the length of these strips depends on the size of the switch, with a little experimenting the right length is found. These two strips should be bolted on at "a". This switch gives a good quick throw with a slight movement of the hand.

Contributed by

CARL SCHARDT.

INTERESTING EXPERIMENTS.

I have an interesting little experiment, which, I think, will be amusing to the other amateurs.

Take an incandescent lamp globe, where *one* wire is broken near the glass pedestal, and connect up to a quarter inch coil (¼") running with a fairly heavy current (10 volts) and notice how the ends of the broken wires will attract each other and form a bright little arc in the globe. Now connect the coil to a lighter current, about 5 volts, and see how they will repel each other. The loose end will vibrate furiously against the sides of the globe. At night one can see a beautiful brush display, such as is created in Geissler tubes.

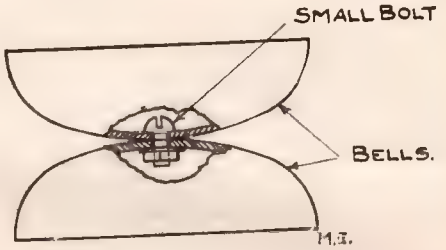
I wanted to see what a still heavier current would do and I connected my 3-inch coil to the globe, but no more than I threw in the switch the bulb broke with a roar like a Leyden jar.

Contributed by

ALFRED HERHOLZ, JR.

A NOVEL CIGAR ASH TRAY.

Most experimenters have one or two old bell gongs in their collection of old material, and if one smokes, a neat ap-



pearing ash tray may be made as per the illustration. The material required consists of two bell gongs, a ½x8/32 screw, and a nut to fit same.

Contributed by

EDWARD W. SCHLEICHER.

HOW TO MAKE LAMP SOCKETS.

A hanging socket for a miniature lamp can be made as shown in the sketch.

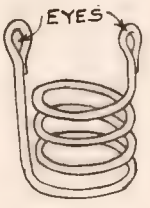


Fig. 1.

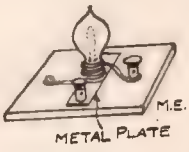
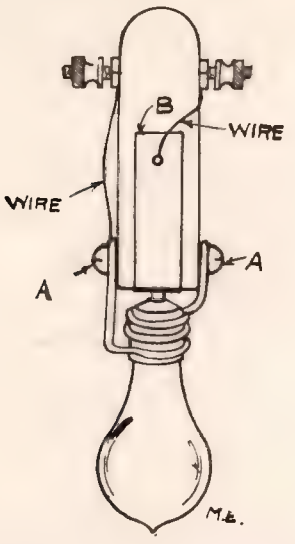


Fig. 3.

A piece of wire is wound around the brass threads in the base of the lamp and eyes turned in each end to receive the tacks marked A in Fig. 1. The wire is shown in Fig. 2.

A piece of metal, B, in Fig. 2, is bent over one end of a piece of broom stick about 3 inches long.



Connections are made from this strip and from the wire threads to binding posts.

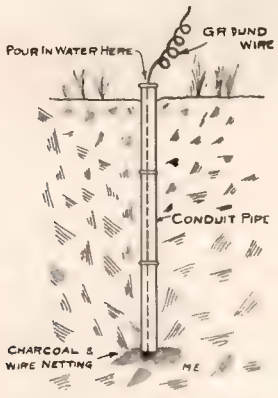
Another socket is shown in Fig. 3; this can be screwed to the wall or bench. These sockets are very easily made and can be made for any size of light.

Contributed by

CLEON C. HAMMOND.

A GROUND CONNECTION.

Here is a form of ground connection for dry places where damp soil cannot be found.



As is shown by the drawing a hole is dug into the ground to the depth of about ten feet. Several pounds of charcoal are put in the bottom of the hole. Wire netting is intermingled with the charcoal and connected to the ground by a bare or insulated wire of not less than a quarter of an inch thick. Next procure some conduit pipe, such as is used for underground telephone cables and run the wire to the surface through this. Then fill in with the dirt all around the pipe. By pouring water down the pipe the ground is kept moist enough for wireless purposes.

Contributed by

MILLARD SMITH.

A REPLY.

In the July number of *Modern Electrics*, B. Moran in his article entitled "Portable Cane Wireless," claims he has improved upon the set which I designed. The construction of a set such as he has described is absurd for many reasons. The faults may be enumerated as follows:

(1) The thumb screw of the detector is exposed, therefore permanent adjustment is impossible; (2) the method of slotting a thin aluminum rod and attaching the tuning coil rod to it, is more feasible on paper than in practice; (3) no dimensions are given but the aluminum rod must necessarily be of large diameter to allow for the slider and coil; (4) the detector could only be put in place by sleight of hand, however nice it can be done on paper; (5) B. Moran must live in a rather peculiar country in which the holes in the ground come conveniently threaded so the cane may be screwed in; (6) lastly, the small box containing the detector, as in my set which may be carried in one's watch pocket, is a great improvement on any makeshifts which may be stuck in a cane.

LEWIS C. MUMFORD.

STRENGTHENING WIRELESS SIGNALS.

In the July issue of *Modern Electrics* I noted a method for strengthening wireless signals. I have been using the following method, which is quite similar, for some months.

In nearly all lighting circuits, one side (in A. C. circuits, the low side of the transformer) is grounded. If yours happens to be one of this kind no other apparatus is necessary. Simply con-

nect the side of the circuit which is grounded to your ground. To ascertain which side is grounded, connect one side of an eight C. P. lamp, of the same voltage as the line, to your ground and connect the other side to one of the line wires. If the lamp does not glow, try the other line wire, in place of the first. The side of the line which lights the lamp is the one which is not grounded. It is best to connect a S. P. S. T. switch between your ground and the line ground, and leave it open when not receiving.

This method works nearly the same as that of Mr. Stone, acting differently with local stations of different wave lengths, and increasing distant stations fully 300 per cent. As an illustration I get Cape Cod (M.C.C. 120 miles air line), ordinarily loud enough to read at about a foot away from the phones, while with the line ground in, I get him loud enough to read while the phones are lying on the table fully three feet away.

The only way I can account for the strengthening of the signals, is that it is due to the line wire acting as a sort of loop aerial or, perhaps, a loop ground.

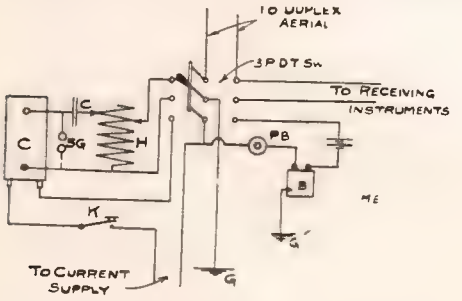
All my tuning was done with a double slide tuner.

Contributed by

LELAND W. DAVIS.

HOOK-UP FOR SWITCH.

Here is a hook-up for using a 3 P. D. T. switch to disconnect half the aerial



when sending and use the whole when receiving, using one switch.

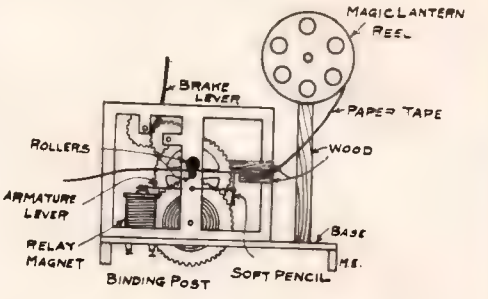
It also connects a buzzer test when thrown to the receiving side.

Contributed by

J. B. COWPER.

A SIMPLE RECORDER.

Following is a description of a first-class recorder, which may be made at little expense, and is fine for learners, and also for short distance wireless.



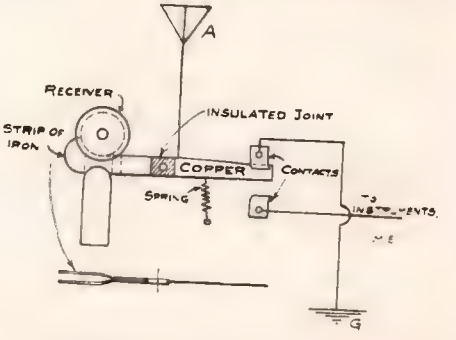
The works of an old alarm clock are first obtained. The escapement is next taken out, the hands taken off and rollers put on here. A small lever is then placed on the works to serve as a brake for regulating the speed. The paper tape (which is obtained from any dry goods man) is pulled from the reel, down between the wooden strips, by the two rollers on clock works. The balance can be understood by examining the sketch.

Contributed by

ALBERT W. ANDERSON.

A NOVEL GROUNDING SWITCH.

I am sending you a drawing of a handy thing for a wireless set. It enables an operator to ground his set when through.



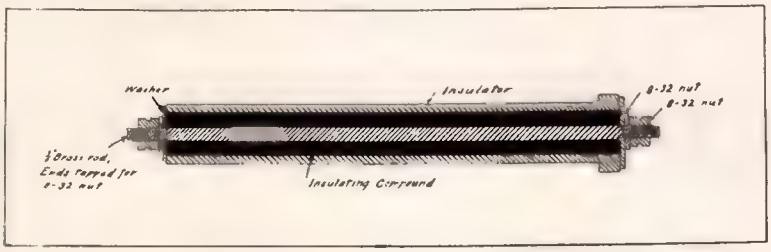
It is something like a telephone hook. When the receiver is on the hook it is grounded and when it is off, the instruments are in use. Any one who has one can get into the habit of hanging up his receiver and know his instruments are safe. I think the drawing will explain itself.

Contributed by

R. THOMPSON.

LEAD-IN INSULATOR.

Of all the lead-in insulators described in *Modern Electrics* I think this one is the most efficient and is much handier, as no wire has to be fished through when making changes. The construction is plainly shown in the drawing. The rod through the tube may be either copper or brass. 3/16 in. in diameter, threaded on each end to take an 8/32 battery nut. The space between the wall of the tube and the brass rod should be filled with the composition taken from the tops of old dry cells. A brass washer is placed against each end of the tube and is held in place by a thin battery nut. A large battery nut on each end completes the insulator. Contributed by



OLIVER S. EVERETT.

Book Review.

PRACTICAL APPLIED ELECTRICITY.

By David Penn Moreton, B.S., E.E.

Published by The Reilly & Britton Co., Chicago, Ill. 450 Pages, 333 Illustrations, bound in flexible leather, with gold stamped title. Price $2.00.

Though the publication of this book was considerably retarded, it is now ready for distribution, and undoubtedly "the last word" on applied electricity. Those who have waited for this book, are more than repaid, in the manner that the electrical field has been thoroughly covered, within the compass of such a small edition. As a reference book, it has no equal, even omitting the low cost at which it is offered. The diagrams are self-explanatory for the most part, and greatly aid the practical electrician in his work. It is a book well worthy of the author, whose capacity is recognized in the electrical world.

We do not hesitate in recommending this book to the technical man, the student, the experimenter, the electrician, and lastly, the layman seeking a reasonably priced electrical publication, covering the field in a concise manner.

TO MARS VIA THE MOON.

By Mark Wicks.

Published by J. B. Lippincott Co. of Philadelphia. 328 pages, 15 engraved plate illustrations, bound in stiff cloth cover, with gold lettering and design. Price $1.50.

This book is published at a timely epoch, when all the world at large has become interested in our neighboring planets, and the question of their inhabitation. The book is dedicated to that eminent astronomer, Professor Percival Lowell, and based on his theories and discoveries.

While the book contains fiction that will hold the reader spell-bound until the last page is reached, nevertheless, from a scientific point of view, it is a very valuable book for advancing new theories and probabilities. Not only may it be read as a pastime, but it is recognizable as a text book. The description of the conditions on Mars, are unique, the people, cities, method of transportation, canals and other features, while based on the most conservative theory, make interesting reading. The very clear maps of the planet with its "canals" are especially worth mentioning.

This book should appeal strongly to those interested in the researches in connection with the planet Mars, and almost as appealing for the average readers seeking an enjoyable scientific novel.

A GREEN WRAPPER
means your subscription expired. Better renew to-day and you won't miss important numbers.

World Radio History

ELECTRIC TIME KEEPING.

(Continued from page 344)

tached, but it operates at zero, which is an ideal condition. The shape of the impulse surface of the pallet, J, is mathematically designed to yield an impulse beginning with great gentleness, increasing to the maximum at the zero position of the pendulum, and diminishing in identical ratio. The switch cannot stop in closed circuit and the dials can be rapidly set to time by moving the lever from normal, N, to retard, R, or accelerate, A. At A the click which normally releases the gravity arm once every thirty seconds, lets it drop every two seconds, while at R the pendulum swings free, the click being out of action. The detached gravity escapement in the controlling pendulum above described is the recent invention of Sir H. H. S. Cunynghame, K.C.B., and Mr. F. Hope-Jones, M.I.E.E.

The various clocks depending upon the master clock are very simple, consisting of an eletro-magnet, which attracts an armature fastened on a dog catching into a large cog wheel. The magnet at each impulse advances the cog wheel a predetermined distance which in turn moves the dial hands a given distance. There are various precautions taken, such as a warning should the current supply fail, and other features tending to make the system absolutely reliable.

ELECTRIC TRUCKS FOR HANDLING BAGGAGE AND FREIGHT.

(Continued from page 343)

of general merchandise freight every night. They distribute the freight from cars and barges to 85 cars placed alongside the platforms, and have to ascend inclines from the barges. We are informed that they have shown already a saving of over 30 per cent. in the cost of handling freight. These trucks are built by The Automatic Transportation Co., of Buffalo, N. Y.

TRI-STATE WIRELESS ASSOCIATION.

The Tri-State Wireless Association has just been organized, the following officials being appointed: C. B. DeLa-Hunt, President; O. F. Lyons, Vice-President; J. Marchisio, Asst. Vice-President; C. Cowan, Secretary; T. J. M. Daly, Asst. Secretary and Treasurer; A. McKelvy, Consulting Engineer, and G. B. Ehrlich, Applicant Solicitor. Our purpose is to bring together all the wireless enthusiasts within the three states; Tennessee, Arkansas and Mississippi. We will take pleasure in corresponding with any other wireless clubs.

TRI-STATE WIRELESS ASSOCIATION,
Memphis, Tenn.

NOTICE.

International Brotherhood of Radiotelegraphy Operators:

PREAMBLE.

The object of this union shall be: To promote by proper means, the material and intellectual welfare of its members, to aid and assist needy operators, to protect its members from misuse at the hands of their employers; to fix wages and hours, etc.

ARTICLE I.

I only give a brief statement concerning the International Brotherhood of Radiotelegraphy Operators organization. It is my plan to secure the co-operation of all radiotelegraphy and radiotelephony operators towards preparing a constitution and by-laws for a union.

Suggestions are asked for from all readers of this article. Full information will be published at a later date.

LEO BENTLEY,
East San Pedro, Cal.
Box 13.

WIRELESS ON THE MOTOR BOAT.

(Continued from page 348)

The range of this set during the day will be about 10 miles transmitting and 25 miles receiving. At night this distance is generally doubled, owing to the absence of sunlight.

While the cost of this outfit is rather high, it must not be forgotten that it may be the means of saving your boat and maybe your life on some occasion. All the wireless apparatus herewith described is of the standard commercial make and very efficient.

Wireless Telegraph Contest

Our Wireless Station and our Laboratory Contest will be continued every month until further notice. The best photograph for each contest is awarded a monthly prize of Three (3) Dollars. If you have a good, clear photograph send it at once; you are doing yourself an injustice if you don't. If you have a wireless station or laboratory (no matter how small) have a photograph taken of it by all means. Photographs not used will be returned in 30 days.

PLEASE NOTE THAT THE DESCRIPTION OF THE STATION MUST NOT BE LONGER THAN 250 WORDS, AND THAT IT IS ESSENTIAL THAT ONLY ONE SIDE OF THE SHEET IS WRITTEN UPON. SHEET MUST BE TYPEWRITTEN OR WRITTEN BY PEN. DO NOT USE PENCIL. NO DESCRIPTION WILL BE ENTERED IN THE CONTEST UNLESS THESE RULES ARE CLOSELY ADHERED TO.

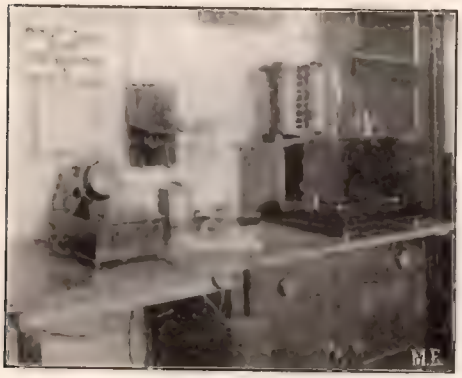
It is also advisable to send two prints of the photograph (one toned dark and one light) so we can have the choice of the one best suited for reproduction.

This competition is open freely to all who may desire to compete, without charge or consideration of any kind. Prospective contestants need not be subscribers for (the publication) in order to be entitled to compete for the prizes offered.

FIRST PRIZE THREE DOLLARS.

THIS station is the result of three years of experimenting with home-made apparatus. I made all of the instruments shown, except the key and headphones.

The receiving instruments are mounted on the case on the left end of the table. The turned work on the "doughnut" tuner I did in the shop at school. The primary coil has a slider,



the secondary a seven point switch. The small wheel on the left side of the tuner revolves the secondary, or "doughnut." The detector is a silicon, and the phones are Murdock, double, 2000 ohms. The condensers and all connections are in the case.

For transmitting I use the lighting current. In front is the one-quarter kw. open core transformer on the condenser case. This case contains ten glass plates, nine by fourteen inches. In the cabinet under the table are impedence coils regulated by the twelve point switch above the tuner. The helix is of No. 6 copper. For the spark-gap under the helix shelf, I use two aluminum strips, which give a high pitched spark. The key is a Morse key, to which I fitted heavy brass contacts.

The aerials, consisting of two wires each, run north and south 200 feet from a central mast 24 feet high on a 55 foot building. The lead wires run to the switch on the wall.

I have communicated with fifty fellows in Chicago within a radius of ten miles. My call is U. Q. My record for receiving at night is U.J., the United Fruit station at Cape San Antonio, Cuba.

I am sixteen years old and I have been a constant reader of *Modern Electrics* ever since I subscribed before the publication of its first issue. I have derived much pleasure and instruction from its interesting and instructive columns.

EUGENE M. VIGNERON,
Chicago, Ill.

HONORABLE MENTION.

I enclose photo of my wireless telegraph station.

My aerial consists of four wires 200

feet long and 3 feet apart and 75 feet high.

My sending instruments are one-half kw. closed core transformer (under table) and condenser (on right) made up of four sheets plate glass 28x46 inches coated on both sides with tinfoil. To the left of this is a loose-coupled helix and three muffled spark gaps of different types. I also use a break key as described in *Modern Electrics* some time ago.

My receiving instruments consist of a loose coupler (2500 meters), fixed and variable condensers, 3 galena detectors, 1 silicon, 1 carborundum, 1 ferro-silicon, and a pair of 4400 ohm W. E. receivers. I find the ferro-silicon detector best as it holds its adjustment, is very sensitive and not greatly injured by static. All instruments were made from directions from

Modern Electrics with the exception of the receivers and transformer.

With this set I have sent 148 miles and received 2300. However, I only received one message this distance (from NAX), Colon. My usual range is about 1500 miles.

My call is R.W.M.

ROBERT MUNS.
New Jersey.

HONORABLE MENTION.

Inclosed find photo of my wireless station, which was constructed by myself for experimental purposes.

The instruments are all in a black walnut roll-top desk and so arranged that I can reach all movable parts with ease, as you can easily see in the picture.

The instruments are all home-made and for sending I use a two kilowatt transformer which is under the desk, and which I control with a small Morse key with large contacts.

For receiving I use the loose-coupler connected in series with a loading coil, also a fixed condenser and a rotary one with 39 plates, perikon and peroxide of lead detectors, and potentiometer, while

the head phones are of the Weston Electric type, wound to 3000 ohms.

The aerial is of the looped form and is 100 feet high and 200 feet long, with 10 foot spreaders.

With this set I can send over 200 miles and have received Washington, D. C., a distance of 500 miles over land; also Glace Bay, Savannah, as well as many ships on the ocean.

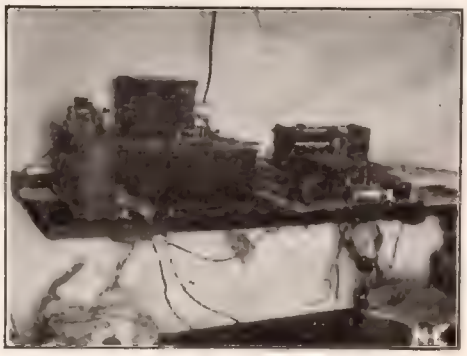
PHILIP H. MILLER.
New York.

HONORABLE MENTION.

Enclosed find photograph of my wireless outfit, which may be described briefly as follows:

To begin with, the aerial, which is 26 feet high, in the attic, is composed of 9 tinned copper wires 20 feet long and 18 inches apart. Ground connection is to city water pipes.

On the transmitting side I have a break key modeled after one described in March (1910) *Modern Electrics*, an



independent interrupter with condenser, a 300-watt induction coil with a heavy secondary winding, glass plate

condenser sealed in box, helix wound on hard rubber frame, and small zinc spark gap. Have never used more than 60 watts with the coil, so the small gap serves the purpose. Owing to low aerial have never been able to send very far, though have had excellent results in receiving.

On the receiving side, have a loose-coupled tuning transformer, primary wound with bare No. 22 tinned copper wire on 3 inch tube and secondary wound with No. 27 silk-covered wire, a set of adjustable condensers, a Ferron detector altered to use galena crystals, and a 2000 ohm Holtzer-Cabot head set.

Most of my apparatus, including the coil, was built by myself. Have received many valuable pointers from *Modern Electrics*. Also have other instruments under construction.

I have, on different occasions, read messages from HA. WQ, SH and most of the nearer commercial and government stations, including some ocean steamers, the best work being done in winter.

HERBERT A. HILLER,
New York.

HONORABLE MENTION.

Enclosed please find picture of my wireless set. For receiving I use The Electro Importing Co.'s 2000 ohm receivers which I think are fine.

I also use a silicon detector, two tuning coils, fixed and variable condensers, the condensers are not showing, as they are under the table. Have a D. P.D.T. switch.

For sending I have a one-half kw. transformer, plate glass condenser and helix, using 110 volts A. C.

My aerial consists of two 55 foot poles 65 feet apart, two 12 foot spreaders with six wires of No. 18 annunciator. Have my own connections and made most of the instruments.

BERT SANDHAM,
Los Angeles, Cal.

HONORABLE MENTION.

Enclosed you will please find a picture of my 2 kw. station, which was entirely constructed by myself, with the exception of the receivers, which are Murdock Pro. 5000 ohms, the 25 amps. Weston ammeter and Murdock detectors. One of the detectors I rebuilt so I could use it either as an electrolytic or mineral by changing the graphite cup for a mineral chuck. Both these detectors have shorting switches. I use two loose couplers, which I built from Murdock tuning coils. My transformer is a closed core and is self-controlling. Taps being brought out to a switch from the primary and I get the following variations on the seven taps, viz.: 18½ amps., 9¾ amps., 7 amps., 6 amps., 5½ amps., 5 amps. and 2½ amps., you will note the condenser above the transformer, which is built of 10x12 inch glass plates. It is very easy to adjust and is very compact. The spark gap is ¾ inch in diameter, made of a composition of aluminum and zinc, and has radiators. It is supported on ⅜ inch hard rubber, with a ⅜ inch air space between it and a block of hard wood. The secondary of the oscillation transformer is 24x14 inch., with 20 turns of No. 4 copper wire, supported on fibre strips. The primary has six turns of ⅜ inch copper tubing, supported on fibre. I use a complete break in system, built in the key, the key being also of a magnetic blow-out type and gives very good service. I also tune with a hot wire meter, which you will note between switchboard and oscillation trans-

former. My switchboard is marble, the main switch to the side of loose coupler, lamp switch above it, center switch, to switch in and out the ammeter, and a switch to the transformer, which is shorted on the lower part with a high resistance graphite rod to take static from the line; above the switch are two more graphite rods and anchor gap with one point to the ground to drain static from the line and serves as a good protection. The main and transformer switches have 25 amp. fuses, and the lamp and the line to graphite rods and anchor gap have 4 amp. fuses; below the switch to the ammeter, is a push button for the buzzer, used for testing the detectors. I connect both detectors in series and the one I want to use I leave the shorting switch open and close the switch on the other detector. My aerial is a straight-away type, composed of six wires, spaced 3 feet apart, about 100 feet long, one end, about 60 feet high, and the other 50 feet. I am directive north and hear Table Bluff, North Head, Washington and Cape Blanco, Oreg., very fairly in the evening. My call is W. A. L.

W. A. LIVINGSTON.
Oakland, Cal.

HONORABLE MENTION.

Enclosed find the photograph of my wireless station which is situated in the attic of my house. To the left of the table is the receiving set which consists of a double slide and single

slide tuner, silicon detector and 1000 ohm phone. To the right of the table is my sending set which consists of a one inch coil, key, E. I. Co. zinc spark gap, one quart Leyden jar and glass plate condenser. I also have the necessary switches for above outfit. My aerial consists of four strands of wire 85 feet long and 2 feet apart. One end of the aerial is 50 feet high while the other end is 30 feet. I can receive 300 to 400 miles with my outfit.

JAS. A. PLUMMER,
New Jersey.

HONORABLE MENTION.

Most of the apparatus shown in the photograph of my wireless station, were purchased. They consist of a one-half kw. transformer, spark gap, interrupter, glass plate condenser, helix, and a pair of 1000 ohm receivers.

I also have two fixed condensers, variable condenser, 2 slide tuner, and a number of different detectors, both mineral and electrolytic. My aerial is 60 feet long and 60 feet high, composed of four aluminum wires. If it were not for the many valuable suggestions and information given through *Modern Electrics*, I would not enjoy my present success with the apparatus.

RAL. J. BRINKMIER,
West Virginia.

NOTICE.

The Amateur Wireless Association of Schenectady was organized some time ago by the amateurs of Schenectady, N. Y.

At the last election the following officers were elected:

President, W. Hughes.
Vice-President, D. F. Crawford.
Secretary, L. Beebe.
Ass't. Secretary, R. Smith.
Treasurer, P. F. Cornish.

Any one interested in wireless telegraphy and telephony and living in or near Schenectady is cordially invited to become a member.

Further particulars may be had from the secretary at 1143 Albany street.

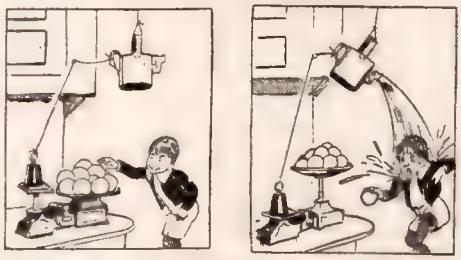
Flying Sparks

A KIND SOUL.

Professor (after he has handed everything to the robber): "Perhaps you would also like to have this complete volume—'Higher Astronomy?'"

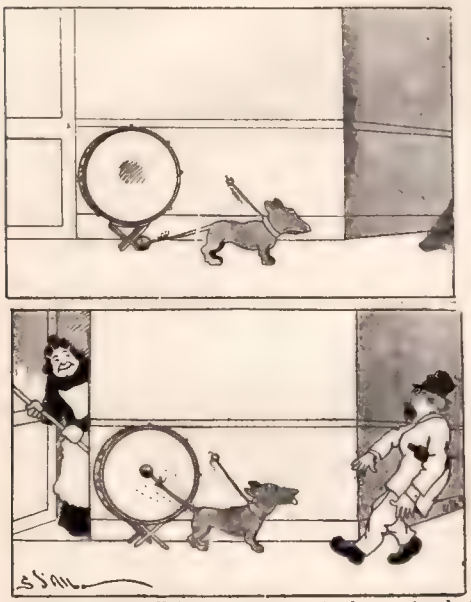
Robber: "No. Ever so much obliged; but I really don't wish to rob you!"—Fliegende Blaetter.

A GOOD SCALE,



and how it punishes Willy.—Le Papillon.

A NOVEL ALARM.



How Madame Zeboos arranges to hear at what time her husband comes home from the banquet.—Pêle Mêle.

OUR INVENTIVE AGE.

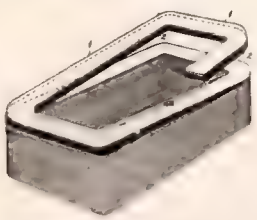
Farmer (after having poured the coffee on the tablecloth): "A lot do I think of their Airships and their foolish Wireless Telligraff, when they can't even invent a decent coffee-pot!"—Fliegende Blaetter.

THE CLEVER SERPENT.

The Serpent: "I will surely be run over—if I don't build an arch in a hurry."—Pêle Mêle.

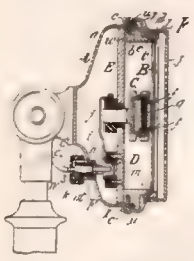
Electrical Patents for the Month

999,893. WINDING-COIL FOR DYNAMO-ELECTRIC MACHINES. CHARLES E. SKINNER, Wilkinsburg, Pa., assignor, by mesne assignments, to Westinghouse Electric & Manufacturing Company, East Pittsburg, Pa., a Corporation of Pennsylvania. Filed Oct. 7, 1908. Serial No. 456,609.



1 A fireproof coil for electrical apparatus comprising a plurality of turns of conducting material separated by metal foil treated to produce an insulating coating or film on its surface.

1,000,795. TELEPHONE-TRANSMITTER. FELIX GOTTSCHALK, New York, N. Y. Filed Aug. 11, 1910. Serial No. 576,744.



1 A telephone transmitter having interiorly therein a metallic block provided with a rearwardly opening socket and connected with one of the electrodes, the transmitter casing having an apertured portion rearwardly in line with said socket, and the terminal tip of the telephone wire adapted for insertion through the said apertured rear portion of the casing for a slip fit engagement in said socket and a device for making a tight closure between the terminal tip and the apertured portion of the casing through which it is inserted, and means which engages the terminal tip and forces it to and holds it in its place in said socket.

1,000,462. ELECTRICAL THERMOSTAT. WILLIAM P. ALLEN, Moon township, Allegheny county, Pa. Filed July 11, 1910. Serial No. 571,706.

1. A thermostat electrically connected involving a head and depending hollow body portion, said head carrying an adjustable contact member, and having a small inner air-tight chamber, the confined air therein not being affected by sudden changes of temperature owing to the comparatively heavy material surrounding said chamber, said body portion being constructed of a heat penetrating material adapted to cause a rapid expansion of the confined air, due to a sudden rise in temperature; a non-metallic elastic diaphragm positioned in the head and forming the lower wall of said air tight chamber; a metallic contact piece above the diaphragm adapted to be raised to circuit completing position in response to the pressure of the expanded air from below acting on said diaphragm.

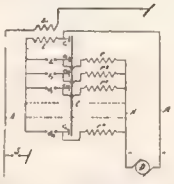
1,001,230. ELECTROMAGNETIC SOUND-WAVE THERAPEUTIC APPARATUS. EMILE BACHELET, New York, N. Y. Filed Aug. 7, 1908. Serial No. 447,449.

In an electro-magnetic therapeutic apparatus; the combination of a pair of opposed generators, each comprising a casing having an opening in one end, a solenoid centered in said casing in axial alinement therewith, a core in the solenoid, a diaphragm in the casing at the end of the solenoid opposite the opening in the casing, a screw for regulating the diaphragm, and a screw for adjusting the core, the latter screw being tapped through the former.

1,001,054. GROUND-WIRE FASTENER. MILTON H. LAWRENCE, Larned, Kans. Filed Mar. 15, 1911. Serial No. 614,724.

1. A ground wire fastener, comprising a rod provided near one end with a tapered portion tapering toward the driving end of the rod, and a rounded head in spaced relation to said tapered portion, and of a diameter greater than said larger end and a thimble mounted to slide on the rod and adapted to be wedged upon the tapered portion thereof.

1,000,397. PRODUCTION OF CONTINUOUS WAVE-TRAINS BY MEANS OF PRIMARY SPARK-CIRCUITS. ROBERTO CLEMENS GALLETTI, Lyon, France. Filed June 24, 1910. Serial No. 568,706.

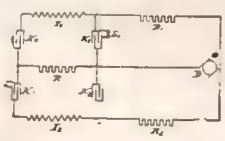


1. An oscillatory system of circuits comprising in combination a plurality of spark gap circuits having a common inductance, a common condenser, and each a separate condenser with an armature in common with the common condenser, and means whereby the resulting capacities of each spark gap circuit may be changed.

1,000,925. CONDENSER. KARL KUHLMANN, Berlin, Germany, assignor to General Electric Company, a Corporation of New York. Filed Apr. 29, 1910. Serial No. 558,489.

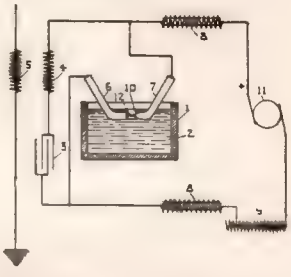
1. A condenser comprising a dielectric having its end divided into diverging portions.

1,000,398. APPARATUS FOR PRODUCING ELECTRIC OSCILLATIONS. ROBERTO CLEMENS GALLETTI, Rome, Italy. Filed Dec. 4, 1908. Serial No. 465,973.

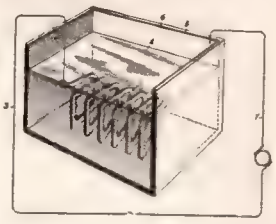


1. An oscillatory circuit having inductances and capacities connected in series, spark gaps between the terminals of two or more of the capacities, and means whereby a discharge taking place in one spark gap increases the difference of potential between the electrodes of another spark gap, inducing a discharge of the latter and thus causing a continuous progression in the discharges of the several capacities.

999,543. APPARATUS FOR PRODUCING UNDAMPED ELECTRICAL OSCILLATIONS. EDGAR S. BECK, Treichlers, Pa. Filed Jan. 28, 1910. Serial No. 540,593.

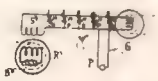


99,749. METHOD OF FORMING COILS FOR ELECTRIC APPARATUS. LEWIS W. CHUBB, Wilkinsburg, Pa., assignor to Westinghouse Electric & Manufacturing Company, a Corporation of Pennsylvania. Filed June 25, 1907. Serial No. 380,710.



1. The method of constructing a coil for electric apparatus which consists in bending a conductor into an open helix, immersing the same in a bath of sodium silicate solution capable of producing an electrolytic valve action, passing an electric current through the helix as one electrode and through the bath to the other electrode, and firmly forcing adjacent convolutions of the helix into close proximity.

990,987. APPARATUS FOR PRODUCING HIGH-FREQUENCY CURRENTS. RUDOLF GOLDSCHMIDT, Darmstadt, Germany. Filed Aug. 26, 1908. Serial No. 450,389.



1. A frequency converting apparatus comprising stator and rotor members provided with windings having mutually inductive relation, means for supplying an exciting current to produce a magnetic field in one of said members, means for rotating said rotor thereby inducing currents of higher frequency in the other member, means for transferring the energy of the last named currents to the inducing member and causing an inductive field of said higher frequency to react upon the induced member.

Original Electrical Inventions for which Letters Patent Have Been Granted for Month Ending Aug. 22, 1911

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Queries and questions pertaining to the electrical arts, addressed to this department, will be published free of charge. Only answers to inquiries of general interest will be published here for the benefit of all readers.

On account of the large amount of inquiries received, it may not be possible to print all the answers in any one issue, as each has to take its turn. Correspondents should bear this in mind when writing.

Common questions will be promptly answered by mail if 10 cents to cover expenses have been enclosed. We can no longer undertake to furnish information by mail free of charge as in the past. There are as many as 150 letters a day now and it would be ruinous for us to continue acting as a free correspondence school.

If a quick reply is wanted by mail, a charge of 15 cents is made for each question. Special information requiring a large amount of calculation and labor cannot be furnished without renumeration. THE ORACLE has no fixed rate for such work, but will inform the correspondent promptly as to the charges involved.

NAME AND ADDRESS MUST ALWAYS BE GIVEN IN ALL LETTERS. WHEN WRITING ONLY ONE SIDE OF QUESTION SHEET MUST BE USED; DIAGRAMS AND DRAWINGS MUST INVARIABLY BE ON A SEPARATE SHEET. NOT MORE THAN THREE QUESTIONS MUST BE ASKED, NOR SHALL THE ORACLE ANSWER MORE THAN THIS NUMBER. NO ATTENTION PAID TO LETTERS NOT OBSERVING ABOVE RULES.

If you want anything electrical and don't know where to get it, THE ORACLE will give you such information free.

TRANSFORMER RATINGS.

(1021.) Arthur Van Pelt, Ill., asks:

Q. 1.—How can the kilowatts of a coil be found if the length of the spark is known in inches, the spark being a good thick one?

A. 1.—Indirectly, the spark length of a coil may be considered as a factor in determining the kw. rating of a coil or transformer, inasmuch as spark length denotes voltage within a wide margin. However, two factors determine the kw. rating of a coil or transformer, namely, the secondary voltage, and the amperage. These two amounts multiplied together, give the rating, inasmuch as the secondary output is only considered in the rating.

Q. 2.—Please give a good all-round shellac for wireless work, one that is not too dear and dries quickly.

A. 2.—A good grade of shellac for electrical purposes may be obtained at most paint stores. We would refer you to our advertising columns, for there are probably some of the advertisers selling shellac to meet your requirements. The more alcohol used in the shellac, the quicker it will dry.

Q. 3.—Please give directions for making a good electrolytic interrupter.

A. 3.—There is a complete chapter devoted exclusively to the description of various forms and types of electrolytic interrupters, by Alfred P. Morgan, in our book, "Construction of Induction Coils and Transformers," sold at 25c, mail prepaid.

A LOOSE COUPLER COIL.

(1022.) A. Bretonnel, Cal., inquires:

Q. 1.—What should be the maximum inside distance of the primary, and secondary tubes of a receiving transformer, and what size wire should be used on the primary, and secondary to give the greatest result?

A. 1.—We presume that you mean the clearance space between the two tubes. This should be either ¼ inch or ⅛ inch. As to the wire to use on both the primary and secondary, unfortunately, as in many other wireless problems, this question is always under discussion and there are many varying opinions. However, we believe that for the crystal rectifying type of detectors, No. 20 on the primary, and No. 28 on the secondary will prove as efficient as any other combination. The condenser should be adjustable, and contain a number of plates to give a good variation in the capacity of the circuit. If the turns on the secondary of the transformer are tapped and lead to a multiple point switch, or a slider is employed, the condenser is not necessary, but will improve the results.

Q. 2.—Does galena, iron pyrites, and ferro-silicon, have to be used in the same manner as silicon? What kind of a point should be employed on each? What is the order of sensitiveness of the well known crystal detectors?

A. 2.—The three crystals above mentioned, are used in the same manner as silicon, and operate on the same principle, of rectifying the high frequency alternating currents. On galena, a small copper wire about No. 30 should be used. Iron pyrites and ferro-silicon will work very efficiently with brass points. As to the relative sensitiveness of the various crystal detectors, it is a rather difficult question to answer, being open to controversy continually from the various supporters of the different types. However, we will quote the results from a series of careful tests performed at a laboratory; viz. iron pyrites, galena, perikon, silicon, and carborundum.

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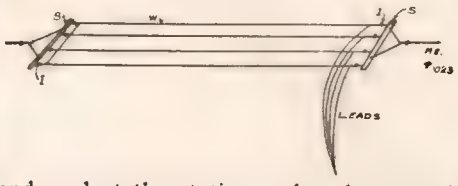
AERIAL CONNECTIONS.

(1023.) Alfred A. Tiegler, Jr., Mass., asks:

Q. 1.—Please furnish me with a diagram of aerial connections to obtain the maximum results with the following instruments: loose coupler, fixed condenser, variable condenser, silicon detector, perikon detector, 2,500 ohm receiver, and switches.

A. 1.—We would suggest that you use the standard straight-away type, with all the wires short-circuited at the farther



end, and at the station end to have a wire coming down from each individual strand of the aerial, but bunched together just before entering the station. This forms the most efficient type of aerial.

EFFICIENT WIRELESS RECEIVERS.

(1024.) Alfred Meyer, N. Y., inquires:

Q. 1.—What constitutes the factors determining the efficiency of telephone receivers for wireless purposes?

A. 1.—The most important are: that both receivers should have the same sound, that the distance between the pole pieces and the diaphragm be very close and yet far enough away to give the diaphragm free play, that the magnetic field be of the ring type and not opened, that the bobbins be wound with the greatest number of turns, for efficient results, irrespective of the size of wire used, that the wire used be copper, silk insulated in preference to enameled or others, and lastly, that the manufacturer has a reputation as a producer of efficient receivers. Attention may also be called to the head band and mechanical details. Comfort is a factor not to be ignored, for it is sometimes a matter of keeping the telephones on one's head for hours at a time. A standard telephone head set of two receivers, should not weigh much more than 12 ounces. The ear pieces on the phones should be flat, for if they have ridges, the ears become pained after a few minutes use.

Q. 2.—Where can I obtain an efficient set of head phones?

A. 2.—You will find in our advertising columns, a number of firms making a specialty of telephone receivers for wireless purposes. We do not hesitate in recommending these to you.

A ONE-EIGHTH INCH COIL.

(1025.) C. J. Sedlak, N. J., asks:

Q. 1.—Number of ounces of secondary wire for a ⅛ inch coil?

A. 1.—Four ounces.

Q. 2.—Should the secondary be insulated from the primary by a fibre tube?

A. 2.—Not necessarily. A cardboard tube wound with a few sheets of empire paper or cloth will be satisfactory.

CONDENSERS.

(1026.) Roy Garner, Okla., desires:

Q. 1.—Dimensions for a ½ inch coil sending condenser?

A. 1.—Three plates, 8x10 inches of glass, with coating on both sides of tinfoil, 6x8 inches. This is the multiple type of condenser of one unit only.

Q. 2.—Will too much condenser at primary contacts cut down the secondary spark?

A. 2.—Yes. There should be only as much condenser used in the primary circuit, as may be found necessary to cut down the harmful arcing.

Q. 3.—Dimensions of a 2 inch coil using No. 32 for the secondary winding?

A. 3.—Length of core, 11 inches, diameter of core, 1⅛ inch, primary wire, No. 14, layers on primary, 2, secondary winding, No. 32, number of pounds on secondary, 4½ lbs, number of sections, 8, wall of in insulating tube, three-sixteenths of an inch, primary volts, 14, primary condenser made of 120 sheets of tinfoil, 9x7 inches.

AN AERIAL AND TREES.

(1027.) A. L. Stevenson, Conn., states:

Q. 1.—My aerial runs through a tree which cannot be avoided; will this lessen the signals? If so, how may this be overcome?

A. 1.—Trees have more or less an effect on the efficiency of the station. However, it is so slight that it may be overlooked, provided the wires are well insulated. There is no way to overcome this if you are using the tree for a support, except if you erect a pole on top of the tree so that the aerial will be far above the branches.

Q. 2.—What code is used by the Signal Corps of the U. S. Army? By the Marconi Co.?

A. 2.—The U. S. A. Signal Corps, do not use any particular code other from the standard ones to our knowledge. The Marconi stations use Continental Code, exclusively.

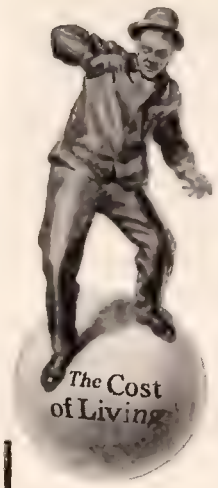
INDOOR AERIALS.

(1028.) Roscoe W. Cost, Md., Asks:

Q. 1.—Would it be possible to send and receive signals from one-half to three-quarters of a mile without using any outdoor aerial, and if so, what instruments should be used and how conected?

A. 1.—Yes, provided an aerial 20 or 30 feet long of two wires is stretched in the room. The instruments should comprise. a double slide tuning coil, a sensitive 1,000 ohm phone, an efficient silicon detector, and a small fixed condenser, wired as shown in the sketch below. With this apparatus, and an indoor aerial, messages up to even 100 miles away may be heard. A ground, using a water pipe, should also be connected.

Q. 2.—Is a 50 foot, four wire aerial, wires spread 2½ feet, too small to receive eighty miles, provided you have sufficient tuning capacity?



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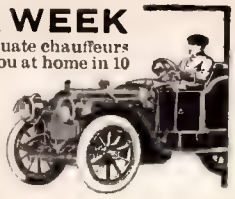

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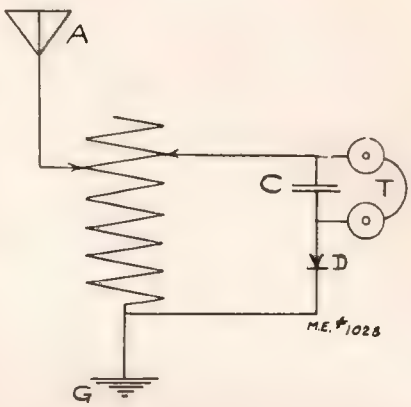
A. 2.—We believe that 80 miles should be covered with the aerial described.



Q. 3.—Would a tuning coil 2¼ inches in diameter be efficient for receiving long distance?

A. 3.—The diameter of a tuning coil does not affect the receiving range to a great extent. The coil mentioned could be used for long distance work, provided the other apparatus is of the right type and manipulated correctly.

MAGNETIC BRAKES.

(1029.) Roscoe W. Cost, Md., asks:

Q. 1.—By substituting an aluminum rod for one of brass, and a salt solution for sulphuric acid solution, in an E. I. Co. interrupter which was connected in series with a pony dynamo-motor, shunt wound, the motor was made to run on 110 volts A. C., but it heated up badly. Why was this possible, why did it heat up, and how can this heating be remedied?

A. 1.—There is possibly one way to remedy the heating of the motor, and that is to reduce the conductivity of the solution by adding more water. Alternating current will heat the iron of the motor, inasmuch as it is not laminated, with the exception of the armature, and therefore it is hardly possible to overcome the heating to any marked extent.

Q. 2.—On what principle are the new electric brakes, (now in service on the subway system of the I. R. T. Co., N. Y.), worked?

A. 2.—We have no knowledge of the particular system of magnetic brake used on the Interborough Rapid Transit system of New York. However, the principle of the magnetic brakes used on many high powered suburban lines, consists in having a powerful electro magnetic field, exert its force on a metal disc connected directly to the axle of the wheels. The current for these electro magnets is obtained from the revolving motors. Thus the action is double, the motors being gradually slowed by the curent which is being taken from them, and in turn this current being used on a metal disc which again acts as a brake on the wheels. While it is very effective, it is doubtful whether

it approaches the high efficiency of the air brakes.

Q. 3.—When the rails of electric trolley lines are welded, how is the expansion and contraction, due to heat and cold, overcome?

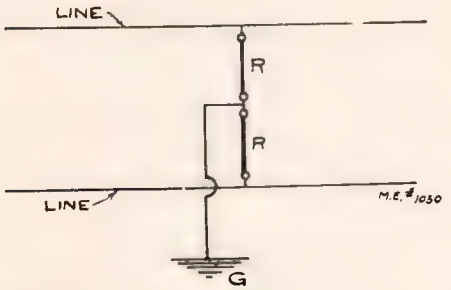
A. 3.—The rails are welded in lengths varying from one-eighth to one mile, and a suitable space is left opened between the ends of the lengths. In this manner, the welding effectively overcomes to a great extent, the losses experienced with the regular "bonds," and the problem of expansion and contraction is met with the openings as stated.

STATIC KICK-BACK.

(1030.) E. W. Wade. N. J., requests:

Q. 1.—Give details regarding the use of protectors for the back kick on primary wires.

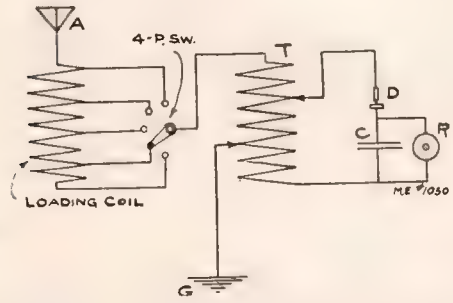
A. 1.—Probably the best method to use in preventing the effects of kick-backs, is to use high resistance graphite rods of



500 ohms resistance, and to connect two of these across the lines. A ground connection is taken off the wire, connecting both, as shown in the diagram.

Q. 2.—How can a loading coil be constructed and under what conditions can it be advantageously used?

A. 2.—A loading coil is nothing more or less than an additional inductance coil in the aerial circuit. It is used to obtain longer ranges than can be obtained with the regular tuning coil only. Thus, if the tuner has a range of 800 meters, and a station such as Glace Bay, possibly having a wave length of 4,500 meters is desired, a number of turns on the loading coil are placed into the aerial circuit so as to raise the wave length to the de-



sired point. This coil is usually wound on a cylinder about one foot in diameter,

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as the close tuning is all done with the regular receiving apparatus, it being unnecessary therefore to have a slider on the coil. A switch with several points, each one leading to a tap on the coil, as shown in the sketch, is used instead.

Q. 3.—What are the call letters of Coney Island and also of Manhattan Beach? To what companies do they belong?

A. 3.—At the present time there is but one station near Coney Island, to our knowledge, at Seagate, and operated by the Marconi Company. Prior to the Dreamland fire, the United Wireless Company operated a station within the tower of that amusement resort. The call of the Seagate station is MSE, while that of the discontinued one at Dreamland, was DF.

WIRELESS TELEPHONE COIL.

(1031.) Ralph F. Naill, Kans., asks:

Q. 1.—How to construct a small coil "P S" mentioned on page 13 of the book, "The Wireless Telephone"?

A. 1.—This coil may be made by winding on an iron core, ⅜ inch in diameter, two layers 5 inches long, of No. 22 D.C.C. wire for the primary. The secondary should be wound with six layers of No. 34 wire.

Q. 2.—Where can I obtain a good telephone transmitter?

A. 2.—We recommend you to our advertising columns. The Electro Importing Co. handle a complete line of telephone apparatus.

WIRELESS QUESTION.

(1032.) J. V. B., N. J., states:

Q. 1.—In my wireless station I have the following instruments: a double slide tuning coil, a universal detector, (I use silicon mostly), a 1,000 ohm telephone receiver and a fixed condenser.

I have tried various hook-ups with little success. Will you please publish in the "Oracle" a hook-up you think would work with the above instruments?

A. 1.—We refer you to our answer No. 1028 in which you will note that the diagram covers the apparatus which you mention.

AEROPLANE WIRELESS STATIONS.

(1033.) Gaston Le Blanc, N. Y., asks:

Q. 1.—Has wireless telegraphy on aeroplanes proven practical and how far have the signals been transmitted?

A. 1.—A number of tests have been conducted in both this country and in Europe. Eight miles have been accomplished at Etampes, France (the aviation school of Henri Farman), in a recent test. As stated in the last issue of this publication, Farman has perfected a silent motor which will enable the receiving range to be greatly increased.

Q. 2.—How is the aerial and ground obtained?

A. 2.—For the aerial, all the metal parts and stay wires of the aeroplane are used. For the ground connection, a long wire is allowed to hang down from the machine. This wire forms a capacity ground.

Q. 3.—Did the tests of the "World" between New York and Bridgeport, for

transmitting by aeroplane wireless station prove successful?

A. 3.—No, the distance between the two cities could not be covered. The tests were abandoned after a few trials.

TANTALUM LAMPS.

(1034.) C. Rodriguez, Cuba, inquires:

Q. 1.—Are tantalum lamps affected by alternating current?

A. 1.—Yes, the filament is gradually shattered.

Q. 2.—Are tungsten lamps practical for railroad cars?

A. 2.—Yes. In recent years a number of improvements have been made in the method of anchoring the filaments, so that the lamps will withstand heavy vibration. The New York subway is at present equipping cars with tungsten lamps, which are proving very successful.

ELECTRIFICATION OF RAILROADS.

(1035.) H. Brightman, Cal., asks:

Q. 1.—Is the electrification of various roads throughout the country proving successful?

A. 1.—On most roads, the change has been for the better. The results seem to indicate that for suburban trains the operation is far more economical by electricity than by steam locomotives. For trunk lines, some railroads report that the change has been a failure. It seems to indicate that the future locomotives for trunk lines, will remain to be steam, but gradually electricity will be used on all suburban lines. For freight, steam is far more practical. It must not be overlooked, that while electric locomotives are being improved, steam ones are likewise being made to consume less coal and have greater speed and power.

Q. 2.—What system does the N. Y., N. H. & H. use for transmitting the current to the electric locomotives?

A. 2.—The alternating current at 11,000 volts, is transmitted over the trolley wire, and on being taken off by the pole on the locomotive, passes through transformers to be stepped down and thence through the motors and back through the rails.

Q. 3.—What is the usual current consumed by a moving-picture arc lamp?

A. 3.—Between 20 and 35 amperes.

TELEGRAPHY.

(1036.) Alfred Gauss, Va., asks:

Q. 1.—What is the usual speed of railroad messages and commercial messages?

A. 1.—Railroads transmit messages slower than commercial wires inasmuch as accuracy is the essential feature. Their speed is in the neighborhood of 12 to 18 words a minute. A good commercial wire will handle messages at the rate of 30 to 40 words a minute.

Q. 2.—How would you suggest learning how to become a railroad operator?

A. 2.—Of course a school is the best method. If this is impractical, we would suggest that you write to the Omnigraph Company, one of our advertisers, who manufacture apparatus whereby it is possible to take a self-teaching course.

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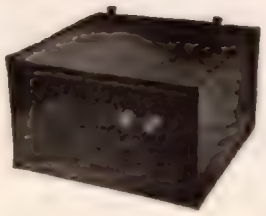

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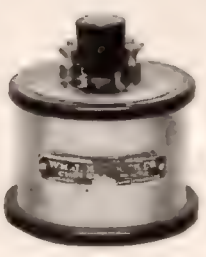

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OPERATOR.

(1037.) Philip Atkinson, N. M., requests:

Q. 1.—Can you inform me as to a method of learning how to become a telegraph operator at home, by means of a self-teaching course?

A. 1.—We know of no better means than by using an Omnigraph, which is an instrument using perforated paper tape, passing through rollers. By so doing, it operates a telegraph sounder, with the dots and dashes comprising complete words and sentences. By this means, the learner has messages sent to him with accuracy, and at any speed which he desires.

ATTENTION OF THE MEMBERS OF THE WIRELESS ASSOCIATION OF AMERICA

(Continued from Page 361)

Should this reach the attention of Donald Dunham, we appeal to him, as a member of our association to communicate with his grief-stricken mother. She is willing that he remain away from home if he so desires, but begs him, if he values her health and happiness, to write and state his whereabouts.

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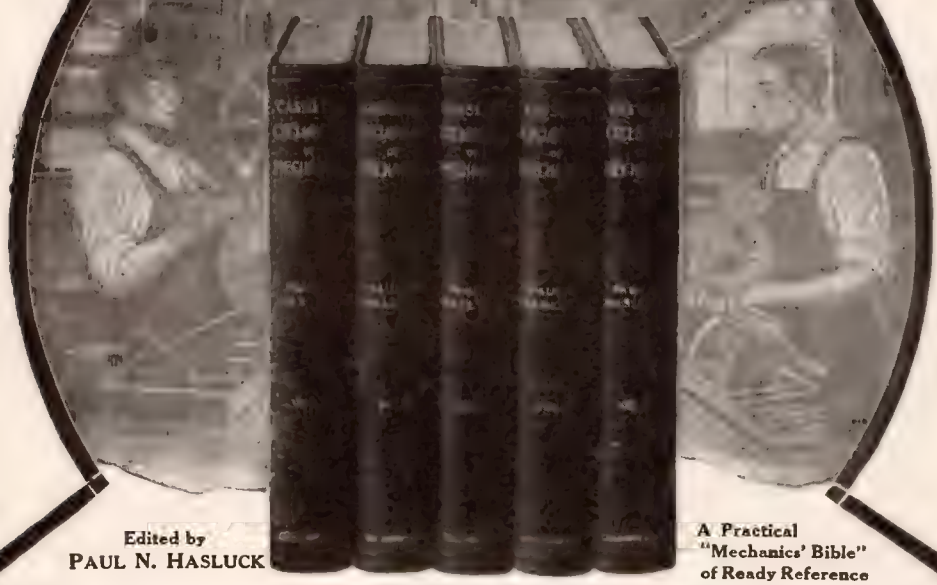

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(Continued from Page 349)

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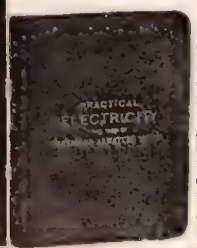

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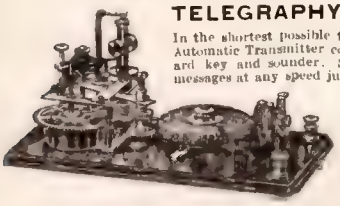

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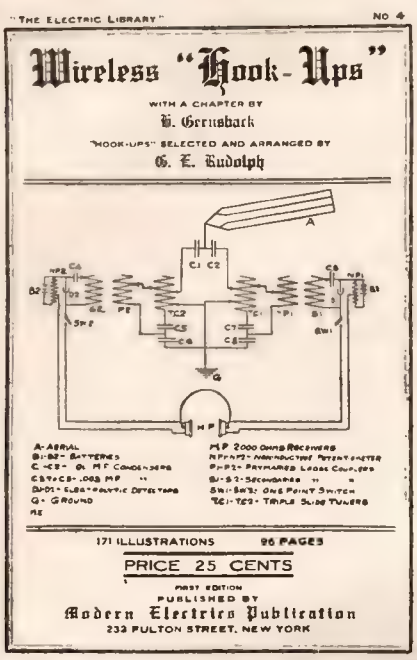

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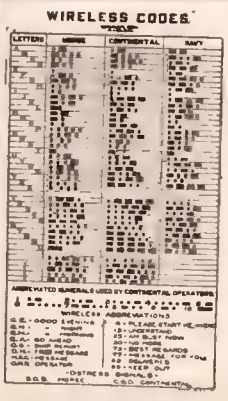

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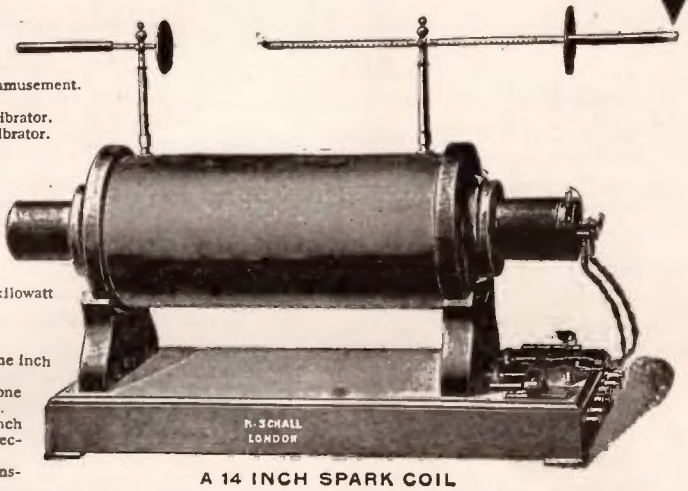

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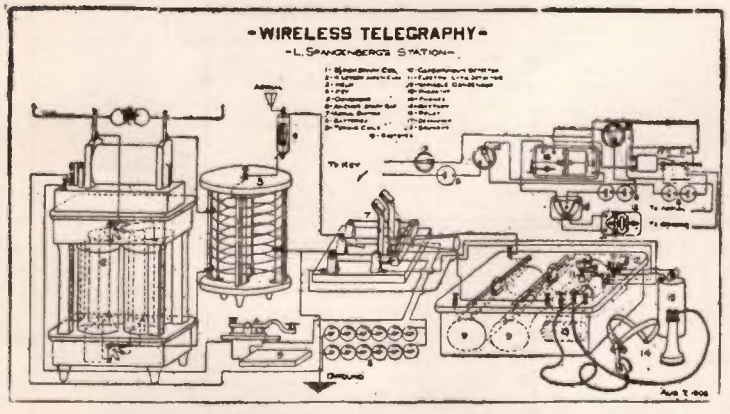

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This arc can be easily BURST IN HYDROGEN by placing the flame of an alcohol lamp in the arc (for wireless telephone). It is the smoothest running lamp made abroad. Bears French stamp and name of the maker.

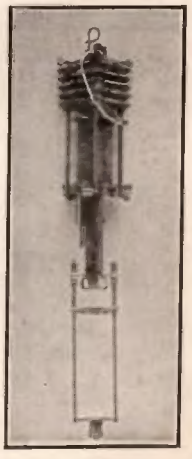
The solenoid and plunger is alone worth $3.00. Most all parts are nickel-plated and highly finished. We guarantee each lamp.

At advertised price we do not furnish carbons nor globe. We furnish carbons at 25 cents additional price.

Size: Height over all, 25 in.; Diameter, 5 1-2 in. Weight, 8 lbs.

ONLY 32 LEFT **$3.00** Regular Price, $16.00

A WONDERFUL BARGAIN



GREAT WIRELESS OFFER

This is our perfect, famous **SLIDER.** Comes in black composition for ground'red composition for aerial slide. The most popular and the most beautiful slider ever designed. Over 35,000 in use now all over the Globe. This slider comes with brass ball andspring and sells regularly for 20 cents each.

Special Offer for This Month:
One Black Slider,
One Red Slider,

Two one-foot pieces NICKEL-PLATED and POLISHED Metal Rods with two holes (to screw down) on each end.

ALL FOR **$0.60** Regular price, $1.00

By mail, extra, 16 Cents.

SLABY-ARCO VACUUM COHERER

This is an Imported Exhausted Coherer; the most up-to-date and the most sensitive one made. Used by eight different Governments. Has solid silver plugs, and German silver sleeves. The lightest tapping decoheres the instrument. When used with a fairly sensitive relay, messages **for over one hundred miles are easily caught** to work a sounder, etc. Standard tuning coils and condensers can be used in connection with the Coherer. Each instrument fully guaranteed.

Now $2.25 Regular price, $7.50
By registered mail, extra 16c.

World Radio History

NEWS

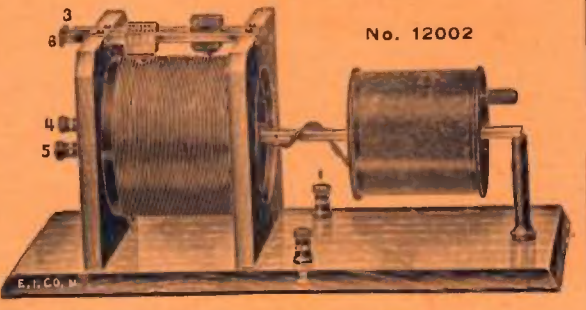
THE "ELECTRO" LOOSE COUPLER. (New Style.)

Pursuant to a large demand by our customers for a loose Coupler with a long style Secondary, we herewith present our New Style, which makes a very fine addition to our now extensive line of apparatus. The workmanship of this Coupler is the highest possible and not by spending twice the amount of money would it be possible for us to build a better instrument.

All wood parts are solid quartered oak, dark finish.

The PRIMARY wound with No. 22 is **BARE COPPER WIRE** wound by our patent process. The Instrument has our patent Hard Rubber composition sliders; one red and one black.

The SECONDARY has **solid hard rubber ends** and is **BARE WIRE** wound. Size of Wire is No. 28 B and S., and neat hard rubber handle is provided to slide the SECONDARY back and forward, and in order to do away with loose connections, we use a flexible cord as we have found that this is very much superior to sliding contacts which are always uncertain on an instrument of this kind especially on a SECONDARY.



ALL metal parts are nickel plated and highly polished. There are 6 binding posts; 4 hard rubber ones and 2 metal ones.

This instrument is the highest class possible grade and has several other improvements which our old style LOOSE COUPLER did not have. We can confidently recommend this instrument to any one and we will unhesitatingly refund the purchase price if it is not all and everything we claim for it.

Despite the fact that this instrument costs us fully 25 per cent. more to make than our old style, we have not raised the price although we ought to, in justice to ourselves.

This instrument is only made in **ONE STYLE**, namely 2 SLIDES; one slide type not being made.

Dimensions: Length of base 12 inches, width 6 inches, height over all 6½ inches; weight 2½ pounds.

NO. 12002 "ELECTRO" LOOSE COUPLER, 2 SLIDES, NEW STYLE, Price $4.00.

THE "ELECTRO" WIMSHURST STATIC MACHINE. (New Style.)

It is with the greatest pride that we introduce herewith A REAL STATIC MACHINE to the American Public.

The machine which we handled heretofore, and which was not our own product, was so flimsy and made so cheaply that we had to replace a lot of them and even refund the money as very often it entirely refused to work.

The machine we are presenting herewith is the acme of American Workmanship and built in our own shops. We have been working on this machine for over a year and we doubt whether we have ever turned out anything better than this machine.

There is not a particle of wood used on it whatever. The only materials entering into its construction are the following:

METAL, GLASS, and HARD RUBBER, nothing else whatever.

The machine which we handled previously had glass plates, 50 per cent. of which broke before they were delivered to our customer. The 7 inch plates, which we use now, are made of ELECTRITE and are all machine moulded with tinfoil sectors pressed right into the plates.

The base is Cast Iron as are the two wheels. The neutralizers are of steel, while the horizontal arm carrying the discharges is of hard rubber as are the discharge handles and the crank handle.

All Metal Parts are Nickel Plated and highly polished and guaranteed not to wear off for one year.

There are TWO PLATES revolving in opposite directions. **THE MACHINE IS GUARANTEED TO WORK IN ALL KINDS OF WEATHER**, and if directions are followed, success is always had. The spark in all cases being from 2½ to 3 inches.

We cannot recommend this machine too highly in all respects and will cheerfully refund the money or replace any machine that fails to come up to our representation in any respects whatever.

Our machine is shipped **FULLY ASSEMBLED** and we guarantee to deliver it in good shape and in working condition.

The size is 8 in. x 5 in. x 10 1-2 in. over all. The weight is 3 pounds.

This machine is guaranteed in all respects and there is nothing to be replaced as nothing can wear out and we will replace any part becoming defective, free of charge within one year if the machine has been treated with ordinary intelligence.

If you are interested in this machine, send at once for our new booklet giving a lot of experiments which can be performed with same.

The "Electro" STATIC MACHINE NO. 9000, NEW STYLE, as described, $3.75.
THIS PRICE IS THE INTRODUCTION PRICE AND WILL BE RAISED SHORTLY.

HAVE you a copy of our famous **196 Page Electrical Cyclopedia No. 9,** containing over **400 illustrations?** The most wonderful book ever printed, containing more information on **all** electrical and **Wireless** subjects than a $8.00 text-book. Send 4c postage today and we will promptly mail it. **Postal cards NOT answered.**

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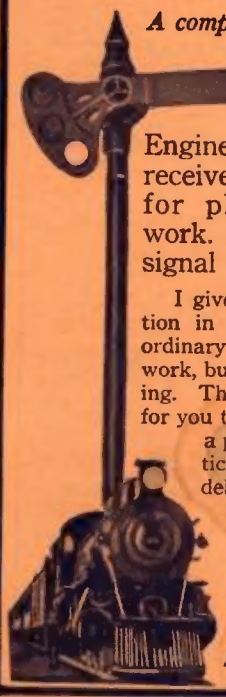
For Chicago and the Middle West (WHOLESALE ONLY, no mail orders) ANDERSON LIGHT & SPECIALTY CO., 70 LaSalle Street, Chicago, Ill.

World Radio History

BE A SIGNAL ENGINEER!



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Plumbers are a happy lot. Big pay, short hours, and trade conditions all their own way. Men always in demand at $5 to $8 a day and more. Don't spend years vainly trying to learn plumbing as an apprentice, but come to the

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and graduate in a few months as a first class competent master workman. Largest, most complete, practical and best equipped trade school in America. Tools and actual working materials under actual working conditions take the place of books.

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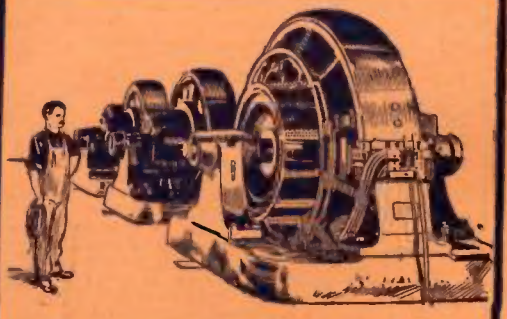
BE AN *Electrical Expert*



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is King. It calls for thousands more skilled men in Electrical Engineering and operating. No field of modern industry offers such fascinating fields of development and such magnificent rewards. Electricians are in big demand everywhere. They earn the highest wages and enjoy the greatest privileges. And yet electricity is only in its cradle. The future is big with possibilities undreamed of. The

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teach thoroughly and practically every branch of electrical work. Most complete, practical, best equipped trade school in America for teaching practical trades that pay. Not only the mechanical or manual part of all trades taught but the business side, too, so that students are fully prepared to draw plans, estimate, and take contracts or go into business for themselves. All instruction is individual. Tools, machinery, instruments and actual working materials take the place of books.

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